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THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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June 20, 1977 — Vol. XI, No. 25

NEWSPAPER

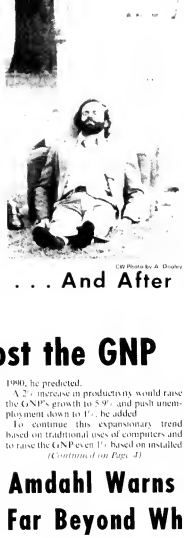
NCC in Big D: Upbeat But Relaxed

CW Photo by E.D. Lundell Jr.

Before . . .

CW Photo by E.D. Lundell Jr.

. . . During. . .



CW Photo by A. Dooley

. . . And After

INSIDE NCC

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DALLAS — Big D was Delightful

The first National Computer Conference in the Southwest in six years convened here last week in a relaxed and friendly mood, buoyed by a healthy industry and Texas-sized hospitality.

Visitors — some 36,000 strong — mobbed both the exhibit floor and technical sessions as well as the town's cramped hotel facilities, reminding veterans of the salad days of the industry in the late '60s.

"Distributed processing" was the phrase of the hour on the exhibit floor, but it took some hard knocks in at least one of the sessions. Data base management — difficult to display in the exhibit hall — was a popular hot button in the sessions, as were computer architecture and personnel management.

But this show will be remembered more for its upbeat mood than for what was said, shown or sold.

Spurred by great Texas food ranging from Mexican through Bar-B-Que to the best of steaks, visitors quickly got into the relaxed and friendly spirit of the show.

A gang of enthusiasts, kids and a number of oldsters, too, mobbed the Personal Computing Fair held in conjunction with NCC for the first time and the crowds — while large all over — managed to keep their cool in spite of the heat, the humidity and a major rainstorm.

Even when more than 1,000 people showed up for a session scheduled in a room for 200, the crowd managed to stay enthusiastic and optimistic while show officials searched for — and found — a larger hall.

Friendliness permeated everything — exhibitors were ecstatic over sales and attendees were happy to see working, useful products, even if there were few that were brand new or way out.

The optimistic outlook of the industry was also reflected by the fact that two banking outfits hosted hospitality suites for firms in the business — touting the funds they had available for investment.

This renewed spirit and reawakened confidence in the business was reflected throughout the huge exhibition hall — built in the middle of an old graveyard — which held 1,140 booths from 300-plus computer companies.

NCC Keynoter Contends

Greater Use of DP Can Boost the GNP

By Nancy French
Of the CW Staff

DALLAS — Greater use of computers can increase productivity dramatically, which in turn can significantly boost the nation's lagging gross national product (GNP), Mark Shepherd Jr., chairman and chief executive officer of Texas Instruments, Inc., told a capacity audience at the National Computer Conference here last week.

The expansion Shepherd was talking about was not in the mainframe area, but rather in minicomputers and microcomputers as well as programmable calculators, which to date have been regarded as a kind of stepchild to data processors (see related story on Page 58).

Citing statistics from the Brookings Institution, the NCC keynoter attributed as much as 50% of all productivity increases to technological innovation, 15% to raw computer power and 29% to other automation, some of which is also computer-based.

Computer technology has accounted for at least one-third of the technological innovation since 1947, he continued. If this is so, the computer has provided about 15% of the postwar period's 2% annual growth in productivity or 3%, he said.

Going a step further, Shepherd said that between 1960 and 1975, the U.S. GNP expanded only about 3% per year on annual productivity gains of 2% to 4%.

If the relationship between the GNP and productivity continues as it has since the end of World War II, the GNP will grow about 2.5% annually between now and 1990, Shepherd said.

However, if productivity increases even one percentage point to 3% annually, the GNP will grow to 4.7% and unemployment will drop from the current 5.6% to 3.4% by 1990, he predicted.

A 2% increase in productivity would raise the GNP's growth to 5.9% and push unemployment down to 1%, he added.

To continue this expansionary trend based on traditional uses of computers and to raise the GNP even 1% based on installed

(Continued on Page 4)

Big Guys Beware: T-Shirted Trekkies Had 'Em Downstairs

By Frank Vaughan
Of the CW Staff

DALLAS — Watch out, mainframers, the hobbyists have finally come of age.

The DPer who wandered downstairs — away from the main exhibit halls of this year's National Computer Conference — entered the land of personal computing. Such a person may never leave.

Downstairs it may have been part of NCC, but with the exception of the ever-present crowds, it was a different world.

You would hear two users talk about systems and never hear IBM, Honeywell, CDC or Univac mentioned. Instead, Imsai, Xitan, Mits and Cromemco popped up in the conversations.

There was less glitter and chrome down-

(Continued on Page 4)

Amdahl Warns Hopes for DDP Far Beyond What's Achievable

By E. Drake Lundell Jr.
Of the CW Staff

DALLAS — I like the cold winter winds that sweep through his South Dakota birthplace, Dr. Gene Amdahl blew through here last week with some chilly news for the proponents of distributed data processing (DDP).

The current "aspiration explosion" for the concept of DDP is "far beyond what can be achieved," the architect of the IBM 360 and now chairman of the firm that bears his name contended in both a National Computer Conference session on "Computering Tomorrow" and a later interview.

DDP will definitely come, but it will be in a far different and more limited form than that presently envisioned by the concept's proponents, the ruggedly featured former farm boy maintained.

Amdahl, who tired of manual computation and designed and built his first computer as a 27-year-old graduate student, said the computer community often gets involved with "fads or fashions" that raise expectations to "almost irrational" levels.

During the session, which drew a crowd of over 1,000 people to a room built for 200, Amdahl said such fads are "disconcerting factors" in the development of future computer systems, which are also constrained by vested interests in the computer industry.

The complexity of the software needed to have a truly global DDP system is staggering, he indicated. Separate parts of the sys-

(Continued on Page 6)

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Six Privacy Bills for Private Sector DP To Be Introduced in Congress July 12

By Nancy French
Of the CW Staff

DALLAS — Six privacy bills drawn from the recommendations of the Privacy Protection Study Commission will be introduced in the House of Representatives on July 12 — the day the commission's recommendations will be formally released, a Washington attorney reported here last week.

Speaking on a panel assembled to discuss privacy and other social issues at the National Computer Conference, Wright Andrews, an attorney with Sutherland, Asbill and Brennan, said the legislation would affect credit, medical, life and medical insurance records; the Internal Revenue Service; and the Privacy Act of 1974.

His report was confirmed by a spokesman for Rep. Barry Goldwater Jr. (R-Calif.) who, along with Rep. Edward I. Koch (D-N.Y.), will sponsor the six bills.

Amendments and Laws

A credit amendment will "close loopholes due to omissions in the Fair Credit Reporting Act and will also affect Truth in Lending," the Goldwater spokesman said.

The bill on medical records will call for a patient's right to access medical records about him maintained by physicians as well as third parties, such as medical reporting services and consumer reporting organizations.

A third bill will amend some of the provisions of the Privacy Act of 1974, including such basic definitions as "system of records," he said.

The Internal Revenue Service would have some of its data gathering and administrative subpoena powers curbed by another bill and, finally, the data gathering and sharing done in the insurance community will also be limited.

The Privacy Protection Study Commission, established by the Privacy Act of 1974, has had two years to study private-needs for personal information and come up with an alternative to H.R. 1984, an omnibus privacy act that, if passed, would uniformly curb personal data use throughout the private sector.

The commission's recommendations, due to be published this month, will suggest that each industry be treated differently, and sources indicate H.R. 1984 will be abandoned.

Most of the objections to privacy laws proposed in recent years have been based on cost, and that issue was raised here again last week.

At the NCC privacy session, Andrews, whose law firm represents Equifax, one of the nation's largest credit reporting firms, said, "People may think I have a hang-up about this, but I know who is ultimately going to pay the bill for this — you and me — the consumer."

Andrews also criticized one of the recommendations that will be made to the President and Congress by the Privacy Commission — the suggestion that a federal privacy board be established to define "in minute detail" what information practices organization can have. "This is going to cause us problems," he said.

Heber Jentzsch, director of the National Commission on Law Enforcement and Social Justice in Hollywood, Calif., was critical of the Congress' failure to pass a privacy bill to protect individuals from abuse by law enforcement computers.

In California alone, as many as 14 different computer systems maintain data on school children. The data ranging from psychological profiles to reports on street gangs and even adolescents who merely live in neighborhoods where such gangs are active.

"There are a million arrests a year," he said, and "450,000 of those individuals are released without facing charges. Most of their resulting rap sheets contain no dispositions."

Further, he said, this often outdated, inaccurate data is circulated and recirculated and eventually causes severe difficulties for individuals in employment and other areas. Some such data even crosses international borders via Interpol computers, which reach even into communist countries, he said.

"Local law enforcement agencies are tied into state law enforcement computers which in turn communicate with the Federal Bureau of Investigation which in turn is tied in with Interpol, which is funded by the Central Intelligence Agency," he charged.

No law allows individuals to access information in Interpol — which is technically classified as a "private business" despite its close relationship with the U.S. government.

Susan Nycum, an attorney with Chickering and Gregory of San Francisco, pointed out that as many as 16% of all reported incidents of computer fraud deal with unauthorized access to personal information.

CW Photo by A. Dooley

No, It's a VW . . .

. . . And PDP Is the Italian Model

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SWEEPSTAKES

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"The sorts are coming onto the track now. There's IBM's highly touted young colt, with his jock clad in the software stable's traditional colors — blushing pink and envy green.

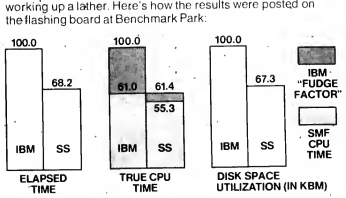
"Will ICEMAN 3 — out of old SM-1-5740, Release 2 — stage a comeback today? Will he be able to make up for his disappointing finishes in the earlier MVS and VS Classics? Only time will tell.

"Now here comes the 'Cinderella Sort' — Whitlow Stables' SyncSort. As usual, he's ridden by his owner and trainer, winsome young Shirley Whitlow.

"How this tousle-headed youngster has struggled to train and develop this magnificent animal, and bring him from dusty county-fair tracks to the bigtime of sort racing! Shirley is, of course, clad in the familiar Whitlow colors — denim blue and tee-shirt white.

Now they're at the post . . . no sign of trouble . . . and THEY'RE OFF!"

We're sorry, but after that everything reverted to modern *cinema vérité*. SyncSort breezed home first without even working up a lather. Here's how the results were posted on the flashing board at Benchmark Park:



Actually, SyncSort would have won by more lengths if it hadn't been for that old, one-eyed race-track judge — SMF. As you probably know by this time, being an experienced "improver of the breed", SMF records only a portion of the True CPU Time that a sort consumes.

We refer to what's left over as the "IBM Fudge Factor." And you'd be surprised how often this gluey mass gets spread on race tracks!

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Management Insultant

DALLAS — Sexism is apparently still rampant in DP.

Even before the National Computer Conference opened officially here last week, Lawrence Goshorn, president of General Automation, Inc., managed to insult at least three industry journalists at his firm's press reception.

In explaining a detail on a slide during a talk, Goshorn remarked that "the girls" in the audience probably "wouldn't understand" the concept he was trying to get across.

Asked by women reporters about employment of women in GA's top management, Goshorn said there are no women in top management — that the firm "hasn't found any who are qualified."

A spokeswoman for the firm, however, indicated GA does have one woman in top management — the personnel manager, who has been with the firm about five years.

Gap Between Management, DP Still a Problem, NCCers Told

By Molly Upton
Of the CW Staff

DALLAS — The lack of knowledge and interest in DP operations on the part of corporate management is appalling, but the fault is not one-sided, Robert Hoherman, director of education and training at Insco Corp., told attendees at last week's National Computer Conference here.

The differences of opinion between DP and corporate management on how DP could do a better job highlights the gap between the two, Hoberman said at a session on communications and education.

Hoberman took this finding from his own survey of 98 corporate executives and 81 DP executives who were questioned on topics ranging from what DP courses would be useful in their work to who should participate in DP projects.

Sixty-five percent of the DPers felt it would be beneficial to have users participate in systems development throughout the project whereas no corporate executives felt this way.

And 56.8% of DPers wanted more corporate management control in DP whereas only 28% of the executives checked this item.

But more managers, 74.4%, wished users had more knowledge of DP applications and only 37% of DPers indicated this was a concern, according to the survey.

Almost 33% of the surveyed executives wanted DPers to have more business knowledge and 47% of the DPers wanted to clearly understand management goals.

Uninvolvement Puzzling

Considering that corporations spend about 12% of their total capital investments on DP, the nearly total uninvolvement in DP operations is hard to understand, Hoberman said.

Citing a survey of Fortune 1,000 companies, Hoberman said large manufacturing firms spend $5,900 out of every $1 million in revenues on DP.

That means many of the top 700 industrial firms spend more than $1 million a year on DP, and DP budgets for the top 100 firms are between $12 million and $100 million, he said.

"It's not a small problem," Hoberman said, adding he doubts whether top corporate officials would stay so uninvolved with any other project that consumes such a high proportion of corporate funds.

The real question is: What is their money buying?

Several consultants such as McKinsey & Co. and Dick Brandon have indicated 40% of DP installations are inefficient and would full if run as a business per se, Hoberman noted.

Communication Key Factor

A key factor contributing to the purported inefficiency is the lack of communication between management and the DP department, Hoberman continued.

Corporate and DP goals are arrived at separately and are not usually in alignment, he pointed out.

Top management lacks the perspective on how to positively implement DP's capabilities, Hoberman said.

Those managers who do take DP education courses are taking the wrong ones, namely programming, he charged.

In Hoberman's survey, both executives and DPers agreed the managers should take courses relating to computer concepts rather than programming.

Eighty percent of the DPers surveyed assigned a priority of "useful" or higher to a concepts course; 85.3% of the executives did the same.

Other courses judged important by both groups were data base concepts and computer modeling.

Hoberman went a step further and said management needs courses on how to manage DP. The courses should explain the advantages of using DP to run a business, such as how to obtain on-line reports, management accounting practices and other applications for management.

They should learn how to use a terminal, he said, noting many executives think a terminal is something a secretary, not they, should know how to use.

The survey showed a difference of opinion on the involvement of management in DP.

Almost 9% of the managers said they take no part in the development or redesign of information systems, while 2.4% indicated they take total charge.

However, this picture is somewhat balanced by the response of DP executives, all of whom denied top management takes total charge of such a project.

Only 3.7% said management takes no part.

Trekkies Lure 'Em Downstairs

(Continued from Page 1)

stairs, note of the Madison Avenue showmanship and fewer expensive giveaways. Even the attitudes were different.

Instead of getting nervous when a 15-year-old started taking literature, the exhibiting vendors welcomed the invasion by youthful visitors, who more than likely constitute an important part of the future market.

No Chrome and Glitter

The lack of chrome and glitter was reflected in the hardware. In the world of hobbyists, an attractive cabinet is a poor trade-off for more memory or an additional interface. Hobbyists want systems that work. Looking pretty is a low priority.

Star Trek was the game here. Sure, versions of lunar landers, craps, chess and tank were played, but Star Trek was king. T-shirts were important, too, and a Star Trek T-shirt was just about the perfect wearing apparel.

Few of the downstairs exhibitors were showing systems, probably because few people would buy one. Instead, kits, boards, Pronis, plugs and cables made up a good part of the display floor.

Floppy disk, typewriter conversions, CRTs, micros, minis, keyboards and little blue, red and green boxes complemented the individual components.

Everyone seemed younger down there. It was somewhat unnerving to talk to a 16-year-old like Nickey Naumovich of Dallas, who displayed a program he wrote at home to plot solar eclipses and give the time and circumstances of local eclipses.

David Solomon from the Riverdale County School in New York City exhibited a math drill and practice program that was implemented in schools.

Some of the people manning the booths weren't old enough to be allowed as visitors on the main floor (14-years was the minimum age up there).

Even members of the hobby market press seemed young.

Creative Computing, a monthly magazine for recreational computing, has staffers that didn't look old enough to enter any of the hospitality suites hosted by the big guys upstairs.

If you were in Dallas last week and didn't venture downstairs to visit the personal computing exposition, you missed one of the best parts of the conference.

NCCs may never be the same.

More DP Use Could Boost GNP

(Continued from Page 1)

mainframes would require a threefold increase in the rate of growth of installed computer power from the current 13% to 14% to about 40% annually, Shepherd said. "Obviously this is not feasible," he added.

The U.S. can achieve a twofold increase through more extensive use of minicomputers and microcomputers by pushing computer usage to problems solved through distributed logic and memory, he said.

Breaking down the GNP into services, manufacturing and agriculture, Shepherd said that manufacturing, which produces 25% of the GNP, experienced 3% gains in productivity between 1974 and 1976; the services sector, which accounts for 65% of the GNP, gained only 1%.

It is this sector that would benefit most from use of computers, he indicated.

Tremendous progress has already been made in manufacturing at TI alone, where automating the design of mechanical parts has increased productivity by 30 to 1 over older methods, Shepherd reported.

Computers have reduced design cycle time for complex integrated circuits by 1,000:1, and productivity of continuous processes has increased by 50% while the complexity of the products being made has tripled, he said.

In the office, computer power has reduced clerical operations such as order entry, production scheduling, purchasing, credit and collection as well as secretarial functions.

In the near future, voice-driven input will provide a "step function improvement in capability," he predicted.

Great strides have also been made in banking and insurance as well as the wholesale and retail arena, he said.

Only in the professions has little been done to enhance productivity and creativity with computer power because there are so few people who can program, he explained:

'Computer-Leveraged Education'

"Computer-leveraged education is a revolution waiting to happen," Shepherd said. Self-paced, self-teaching systems based on computers will aid the student who today graduates from high school without knowing how to read. Such systems will also release scores of teachers to concentrate on the creative aspects of the profession, he said.

"By the early 1980s, computing as a major new discipline must be integrated into our school system so the next generation will treat computers as as much a part of their lives as reading, writing and arithmetic," he said.

Only hospitals have virtually ignored the use of computers to improve productivity, Shepherd charged.

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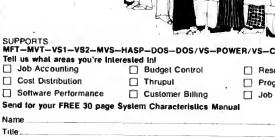

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NCCers Hear It Again: CDP Impact Demands Recognition

By Ann Dooley
Of the CW Staff

DALLAS — Employers and the DP industry must recognize and accept the importance of certification before it can become effective, according to a panel discussing the role of the Institute for Certification of Computer Professionals (ICCP) here last week.

People generally think of DPers as professionals, but until the appearance of the certification examinations, there was a missing link in the concept of professionalism, Merton Walker of State Farm Insurance Co. said.

"I had always considered myself a professional, but it was as an insurance professional doing DP work," he said. After Walker became certified, his feelings about his professionalism did not change, he said.

The advantage of being certified is the ability to maintain a current knowledge of the field and a competitive edge over an uncertified employee in the same department, he said.

The competition factor is only important if the company realizes the necessity of professionalism, Walker said.

State Farm pays employees a bonus for passing the Certified Data Processing (CDP) exam and also pays for books and other costs, he pointed out.

Another advantage of being certified is that everyone subscribes to a code of ethics. Although Walker admitted such a statement might not make any real difference, he added it might make an employee think twice before he did anything.

"You can't legislate morals," but someday it might be possible to revoke a license for a just cause, he said.

The requirements for a DP professional include a CDP, membership in some DP society and most importantly, performing the best job possible, Walker stated.

Behind the CDP Exam

The CDP exam is administered by the Psychological Corp. of New York, which tests the exam's validity and accuracy, according to Sallyann Henry, who works for the firm.

The company's functions include performing basic administrative tasks, test development phase and an analysis and interpretation of each exam, Henry said.

The analysis and interpretation includes examining each individual test question and studying trends in the test results according to occupation, education and region, she explained.

The test development phase consists of establishing the means by which validity of exams are established, she said.

The questions are developed from examples sent in by industry members themselves, she said. The staff sorts them into issue areas and puts them into multiple choice format.

Each question is edited for understandability, relevance and correct grammar and is then examined by a review board. The reviewers are selected on a representative basis by occupation, geographic region and equipment manufacturers, she explained. They also make sure each question is accurate, current and has only one answer.

Only one out of every four questions gets past the review board, Henry said. The ones that pass are added to the test question pool and are selected by issue area.

After an examination, the questions are studied further according to their difficulty level. The level is determined by how many times it was answered correctly or incorrectly, she said. The questions are again examined for understandability, she added.

The accuracy of the exam is established by using the Kuder-Richardson method — a single-administration exam that compares each item to all others in the exam. Other methods compare one set of test results to another set of results and also require retesting, according to Henry.

Validity itself can be measured in three ways: by comparing related criterion, comparing a meaningful trait or relying on expert judgment, she said.

The first two methods are subjective and difficult to measure accurately, Henry said. Who can relate college or job success to test results and who is qualified to decide which trait is mostly directly related to a test score? she asked.

ICCP uses a method which relies on what experts in the field consider to be important knowledge or skills, she said. The certification council sets standards after the final review takes place, as to what scores are needed to pass the exam, she said.

These standards are in keeping with the expectations of what computer professionals should know, she claimed. They are always being revised and updated, Henry added.

Certification is a long way from being generally accepted, according to G. Gary Casper, president of ICCP. Only 17,000 people are currently certified and only 35,000 have taken the exams, he said.

In order for CDPs to be an effective voice in the industry, "I would like to see that number around 500,000, but would realistically have to settle for 100,000, he said.

Even so, ICCP has come a long way since it began, he said. The contract with Psychology Corp., a respected testing company, is "no small step," he stated.

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Vested Interests Seen Slowing Progress

By E. Drake Lundell Jr.
Of the CW Staff

DALLAS — Entrenched "vested interests" — on the part of both users and vendors — will constrain the development of the systems of the future, Dr. Gene Amdahl predicted at the National Computer Conference here last week.

Technology in the field will advance at an "accelerating rate" on top of its past "phenomenal advances." But the constraints imposed by user investment in programming and the "domination" of the industry by one firm that "wants to retain its market share" will be the gaiting factor in future systems development, Amdahl told attendees of a session on "computing tomorrow."

"The IBM 360 line was a great market management tool" for the firm, according to the man who designed the 360 and who now serves as chairman of Amdahl Corp. and chairman of the Computer and Communications Industry Association.

That architecture has penetrated 60% to 70% of the market, he noted, and has caused users to invest about $200 billion in software, support, education and training for that type of architecture.

"Much more" would have to be spent if users were required to change to a different architecture, so you "probably wouldn't find many takers" for a radically different approach "even if you gave the hardware away," Amdahl contended.

"So the future is just going to be a tangent of what we have today," he suggested, adding "IBM will set the direction" of that tangent.

The future will be "evolutionary rather than revolutionary," Amdahl predicted, noting that clues to the direction of the tangent can already be found in some IBM offerings, the MVS operating system in particular.

Operating systems are "enormously complex, much more so than hardware," and will be the key to the future, he said.

Certainly IBM wants to impose change on its users so it can expand its base and obsolete previous products in order to sell new ones, Amdahl said, but the firm will have to go about that task slowly.

In order to migrate its users to new architectures that are more efficient but, at the same time, compatible with their investment in 360-type programming, IBM will have to offer operating systems that allow the user to migrate slowly over a long time to the new systems, he indicated.

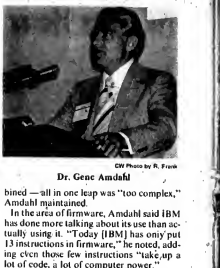
With MVS, IBM has begun the process by providing "clear interfaces" and "functional modules" within the system, Amdahl continued.

IBM will continue this process, breaking out operating systems into functional components, he said.

This may lead to breaking up the hardware into functional units also — so that large systems would be made up of essentially general-purpose computers dedicated to specific functional tasks with special software, he added.

IBM dropped its plans for its Future System series of computers because the move to that type of system — with complete compatibility and advanced functions combined in one leap was "too complex," Amdahl maintained.

In the area of firmware, Amdahl said IBM has done more talking about its use than actually using it. "Today [IBM] has only put 13 instructions in firmware," he noted, adding even those few instructions "take up a lot of code, a lot of computer power."



CW Photo by R. Frank

Dr. Gene Amdahl

DDP Still a Fad, Amdahl Warns

(Continued from Page 1)

tem will be required to reside in separate computers, each with pointers to the other parts of the operating system and to the dispersed but shared files.

Today, he said, operating systems account for 30% to 60% of the execution capacity of a computer system, and he predicted the task of coordinating several systems in a DDP arrangement could force that up to almost the total system capacity.

Networks of systems with global processing and shared files would therefore have to be made up of systems with a much higher level of processing capacity than those touted for the task today — they would have to be networks of "major, not mini" systems, Amdahl contended.

Predictable Cycle

Fads in the DP field follow a predictable life cycle, Amdahl said, with the first flush of heady enthusiasm and extremely high expectation levels followed by a period of quiescence, after which the concept emerges in a reduced but more realistic and workable transformation.

DDP is going through that first stage of heady, youthful excitement where all things are possible, Amdahl said, but should enter the quiet phase in a few years and emerge three to five years later in its workable incarnation.

Another panelist at the NCC session, Dr. Herbert R.J. Grosch, president of the Association for Computing Machinery, added that fads always look good in their early stages because the "brightest" people in the business are usually the pioneers.

But, Grosch said, once "the slobs get their hands on them" the concepts often do not work any better than the previous ways of doing business.

In its final workable incarnation, DDP will consist of local "concentrators" providing some local and regional processing with few if any global inferences, Amdahl predicted.

Microprocessors — "the most revolutionary development in the computer field in my lifetime" — will make this possible.

These local units will most likely have a very limited set of tasks and have to feed information back up the pipeline for any major processing functions. In fact, the local units will be much like highly intelligent terminals, but not quite full minicomputer systems, in Amdahl's view.

All of these units in a DDP network will be "of the same class" instead of being a wide variety of processor types and configurations, he added.

Wasted Dollars

The fad nature of the industry often takes people's attention off the really practical development efforts, Amdahl said, causing manufacturers to waste much of their development dollars in a futile attempt to live up to unrealistic customer expectations.

Noting that he had been "on the opposite side" of many of the bandwagons — "so much so that I was sometimes not welcome in the halls of Armonk" — Amdahl said the business has lived through at least two other major architectural fads; multiprocessing and time-sharing.

Both of these went through all the phases he predicted for DDP. And, in both cases, the initial expectations were never met — at least not as early as expected — although technology moved far enough forward to make them practical.

In the early days of the multiprocessor "fad," there were predictions of great advances with systems that linked together hundreds of processors, Amdahl noted.

But it was discovered that the costs went up faster than the performance benefits with such systems, he said. The need for control and coordination software resulted in a situation where "by the time you got to four processors, you actually had less performance than with three."

Today there are multiprocessor systems that work, he noted, but they are not the complete answer they were touted to be.

Widespread, global time-sharing from dumb terminals was the next big bandwagon that got rolling, he recalled, but once again the task of controlling hundreds of terminals in a network was more complex than expected.

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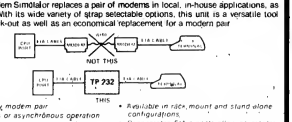

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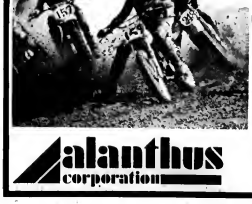

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DP Seen as Good Work for the Deaf But Training Lags

By Toni Wiseman
of the CW Staff

DALLAS — Because good training opportunities are lacking, very few deaf people are employed in the field of DP despite the minimal need for speech and hearing in many DP jobs, according to several speakers at the National Computer Conference here last week.

This does not mean, however, that DP is a profession that is closed to the hearing-impaired. In fact, it is potentially a very good area for the deaf, speakers agreed at a session on "Computers and the Deaf."

According to Ray McCloud Jr. of Texas Christian University in Fort Worth, the computer profession offers three principal areas of job opportunities — operations, programming and systems analysis.

The deaf have traditionally done well in the operations field, but not much is known about their abilities in the other two, he said.

"I feel it would be very hard for a deaf person to be a systems analyst because of the communications limitations," McCloud said. "But if he had good oral speech, he could do a good job.

"Unfortunately, the communication between the user and the analyst is hard enough now because they speak a 'different' language, and if you impose an additional problem of language and communication, the problems may seem insurmountable," he stated.

Programming, however, is a different story because the communications between the programmer and the computer are completely in writing and there are a limited number of rules which have to be learned. "And you can get a book or a manual with all the rules spelled out," he noted.

Programmers do have to communicate with other people, generally systems analysts. Having a hearing-impaired programmer may actually be an asset in this situation, McCloud indicated, since the analyst would be prompted to improve his written documentation, something which has always been a sore point in the industry.

Education in Cobol

To prove that deaf or hearing-impaired persons could make efficient programmers, McCloud ran a special project last summer to teach Cobol to five deaf junior high students. The two girls and three boys met two hours a day for three weeks. This included two weeks, or about 20 hours, of classroom work and one week, or 10 hours, of laboratory sessions.

McCloud chose Cobol for three reasons, he said. First, it was the language he knew. Second, Cobol is a difficult language and he reasoned that if deaf students could learn it, it would be more than adequate proof they could learn others.

And, last but not least, Cobol is the most common language used in business and commercial work and therefore the one needed to break into the job market, he said.

Unqualified Success

The project was an unqualified success, McCloud stated, although there were some rough points. The students, for instance, had to be taught not only computer terms, but others which those with unimpaired hearing take for granted, such as "file," "data" and "record."

Flash cards were a great help in communicating these words and abstract concepts, he noted.

"My basic idea was to give deaf students a head start so they could attend classes with hearing students and compete. They have to be given a head start if they are to enter the job market and compete effectively," he said.

McCloud suggested that such programs to train deaf programmers could easily be set up in any metropolitan area since only a person to teach programming and one to interpret for the students are needed.

These do not have to be the same person, he said, noting all his lessons were sign interpreted for the summer students.

Higher Education

At a more advanced educational level, Donald H. Beil, assistant professor in DP, described the program offered at the National Technical Institute for the Deaf (NTID) at the Rochester (N.Y.) Institute of Technology (RIT).

This includes a one and one-half year certificate program for computer operators, a two-year diploma course for operators and a three-year associate degree program for applications programmers.

In addition, about 20 deaf students and 550 hearing students are enrolled in bachelors and masters programs in RIT's School of Computer Science. These programs provide career options in computer systems, systems software, applied scientific software, computer science, computer engineering and computer systems management.

NTID also concentrates on Cobol, he said, since "an in-depth knowledge of a single language can increase the problem-solving technical communications skills of deaf students.

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The Winners . . . And the Losers

CW Photos by A. Dooley

Small Users' Needs Paramount, Corporate DP Managers Warned

By Frank Vaughan
Of the CW Staff

DALLAS — Most small computer users within an organization are not interested in running DP installations; they are not DP people and the corporate DP manager should recognize this and respond to their needs, a speaker at the National Computer Conference emphasized here last week.

Larry D. Woods of Deere & Co. in Moline, Ill., recounted the experiences his firm has had with small computer users within his organization.

Deere's corporate computing utility consists of six IBM 370/168s at three different locations. In 1975, the firm took an internal survey of the small computer systems being used as computers, rather than remote job entry terminals, within the company. It included computers located and used in non-DP departments.

The survey uncovered 35 small computers in the corporation, most of which were being used as general-purpose engineering problem solvers or industrial controllers.

In February 1976, a second survey showed the number of small computers had increased to 102. The survey also found some unexpected uses, Woods said.

"Equipment which was purchased for one use was being put to other uses. In two of Deere's manufacturing facilities, for example, the yearly plantwide budgets were being run on engineering department computers.

"A further inconsistency was that in one unit the computer was in the tooling area, a part of manufacturing engineering. In the other unit, the computer was in a product engineering area, a research group," he said.

In the early 1970s, Deere began a concentrated effort to define the company's data and to gain control of its use. The motivation behind the firm's entry into the data base effort was to standardize the data being used within the company.

If this data was the responsibility of a unit, and only used by the unit, then that data became part of the unit's data base. If the data was of corporatewide interest, regardless of which unit had maintenance responsibility for it, that data was considered part of the corporate data base.

"Since all data resided on IBM equipment, and the IMS data base management system was being used, then the standard definition of data bases was in terms of IMS structures. This is what we thought was happening," he recalled.

"In reality, without the knowledge of the Business Systems Department, data which fit the categories of both corporate and unit data was being stored and maintained on small non-business systems computers.

"Naturally, the data structures were different, the access methods were 'homegrown' and most of the programming was in Fortran, a language not used by Business Systems.

"An added item of interest was that some of the applications examined took only days to implement, after sitting in a request queue in the Business Systems Department for months," he explained.

Recently Deere finished its third small computer survey. There are now 150 small computers within the company. Although some of them will be used for process control, not a single one will be used exclusively for process control.

The trend toward small computers with more functions is also beginning in the office area. Dumb terminals are being replaced with intelligent ones, some with floppy disk units. Interest is growing in computer-based, word-processing systems, he added.

"The direction is clear. Much of the computing within our company is leaving the DP department, and it is leaving in an uncontrolled, uncoordinated manner."

In many cases, small computer users understand the additional responsibilities they will be undertaking when they procure a computer; many others do not, Woods said.

"We also find that most users understand the importance of corporate data. They realize that much of the data which they might need resides on the central DP facility and is not available to them unless they are connected to the central site.

"How did we resolve the problem? We gave the user the capability of doing his own computing, but restricted the user from manipulating data without our knowledge and coordination. I am surprised that more DP managers are not encouraging this themselves," he said.

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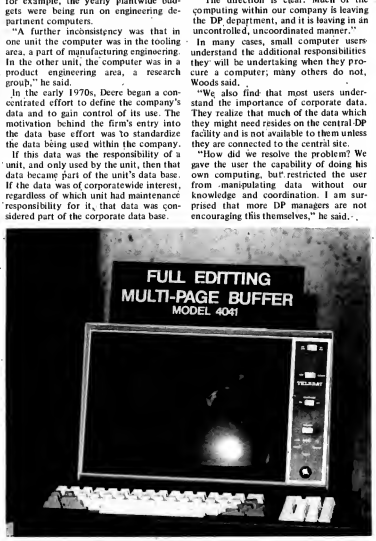
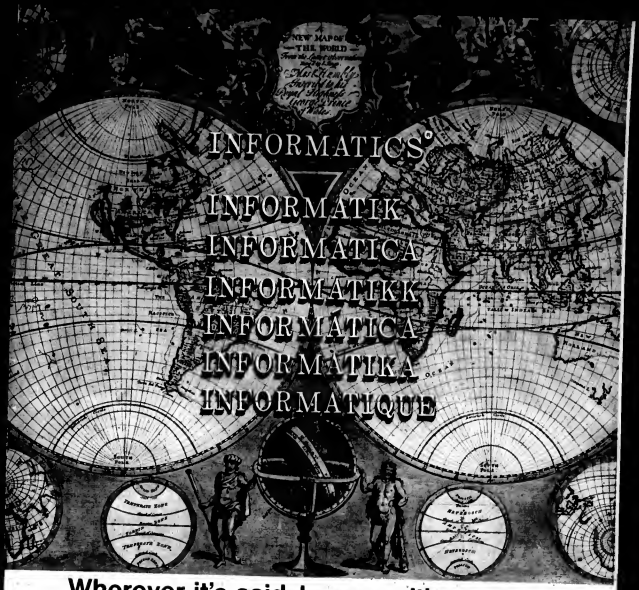


CW Photo by R. Frank

(Sic)

CRTs for complex language applications, like this one from the Teleray Division of Research, Inc., were much in evidence on the NCC exhibit floor last week.



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Calls for 'Structured Humanism'

Stone Sees Feast of Machines, Famine of Management

By Edith Holmes
Of the CW Staff

DALLAS – "Machines we have; leadership and management we don't," Jack L. Stone, consultant and author, told the audience attending the session on "Humanistic Perspectives on Computer Center Management" at the National Computer Conference here last week.

Whatever else the beleaguered DP manager – caught between his company's top executives and the programmers and analysts under him – does, he should talk to the people with whom he works, Stone said.

Communication, he stressed, is probably the most important tool for improving leadership and production in the DP operation.

"Just start thinking about what you can do to improve the motivation of the people working in your installation," Stone urged his audience.

Structured programming, structured maintenance, structured "this and that" – all promise productivity increases, Stone noted. Calling for "structured humanism," the consultant argued that if a person finds some reason to be motivated in his job, his productivity will go up 100%.

The DP manager needs to develop a career program for every employee – with that employee's participation, Stone said.

Operators need to be relieved from their jobs periodically to attend user group meetings and training courses, he stated.

"The security of systems has received a great deal of attention," Stone noted. "But how often do we consider the potential risk to a computer center resulting from a disgruntled employee?"

Only leadership and management can lead to motivated DP personnel who want to build high-quality systems, he added.

Tough Job for Manager

While panelist Julius Aronofsky agreed with Stone, this professor at Southern Methodist University expressed his sympathy with the DP manager and the tough job he has.

DP managers can't afford to emphasize people to the exclusion of remaining aware of technological changes and advances, Aronofsky pointed out.

Today's technological pressures are building primarily from the growth of distributed networks, he said, adding that few DP managers are prepared for this development.

Centralized DP was the norm until recently; the majority of DP managers fear the lack of control that could result from the use of minis and micros in field offices, he explained.

"I believe technological advances are thus contributing to the crumbling management situation in DP organizations," Aronofsky said. Regardless of the potential for field offices to develop their own standards and possibly degrade already poor software documentation, Aronofsky expects 30% of the work now being done at central computer centers could eventually be done in satellite offices on programmable calculators.

Another panelist, William J. Burns of E-Systems, Inc., suggested that DP man-

The Current Situation

Siemens had some problems setting up its booth at the National Computer Conference. A forklift truck reportedly damaged part of the booth's backpanel, and someone knocked over a portion of the booth while it was being set up.

But the real problem came when the equipment, wired for European current, didn't work. A power generator was hidden just outside the exhibit hall with a wire to the booth, since it was too noisy to put in the booth.

agers don't become technically and managerially competent just by going to school.

Managers can only be provided with skills – whether through on-the-job training; a degree program like a masters in business administration; nondegree, after-hours courses; or professional seminars – to make use of them as best they can, Burns said.

User Education

Users, too, need education about the computer operation on which they depend and attention from the DP shops that serve them, according to Paul D. Oyer, planning officer in the U.S. Treasury Department's Office of Industrial Economics.

The best designed system in the world with the soundest programming won't serve anyone if the user doesn't like the overall result, he added.

Oyer stressed the need to find ways to motivate programmers in particular. Generally not considered to be "management material," programmers complain of

CW Photo by R. Frank

Jack L. Stone

being treated like "superclerks who are left out of the planning processes for a system," he said.

Permitting programmers to become involved in the planning phase of a system's life cycle is key, Oyer suggested.

Planning for the programmer should also be of major concern to his DP manager, Oyer and Aronofsky said.

Aronofsky noted that operators rarely become programmers, programmers seldom are promoted to analysts and DP staffers generally do not spend any part of their careers outside the DP room of one company or another.

Faced with no upward mobility and rarely integrated into the rest of a firm the way someone holding a masters in business administration might be, DP people become consultants, Aronofsky said, drawing a chuckle from his audience.

The job requirements a programmer has, his career direction and his skill levels need to be determined, Oyer said. Proficiency, skills, knowledge and aptitude tests should be administered to indicate what training the programmer needs, what his immediate assignment should be and what career development potentially suits him best, he added.

Making the most of terminal intelligence.

A special report on *Data Communications Terminals* in the July 25th *Computerworld*.

Intelligent terminals are changing the way we communicate with computers — making them easier to use, more accessible and responsive to users' needs. And *Computerworld's* next special report will focus on conversational and editing terminals, as well as remote batch terminals, CRTs and teleprinters.

Edited by Ron Frank, this report will examine ways to maximize the benefits of terminal networks while minimizing the costs. Using applications stories and tutorials, we'll cover a wide range of topics:

- Ways to determine how much intelligence (i.e. processing logic and memory) you need when changing from dedicated to multiapplication terminals.
- How some users achieved greater efficiency with their dedicated, "dumb" terminals.
- Ways to adapt your existing network to the emerging line protocols.
- Ways to configure terminal networks for multiple applications.
- Managing terminal networks for corporate efficiency — matching requirements with resources and equipment.
- A review of guidelines to use when evaluating terminals.
- The effect distributed data processing is having on terminal selection and use.

In all, this report could help you cut costs in your organization while establishing a firm base for future expansion. If you have anything to do with data communications efficiency, whether as a DP Manager, Communications Specialist, or Executive with an eye for efficiency measures, you shouldn't miss the special report in the July 25th *Computerworld*.

If you're in the business of manufacturing and marketing data communications terminals, you should put your ad here. You'll reach a rapidly expanding market. For example, International Data Corporation expects to see a tremendous increase over the next three years in the installed value of conversational and editing terminals used exclusively for data communications purposes: from $3.2 billion in 1977 to $5.8 billion in 1980. Your *Computerworld* salesman can give you complete details — but don't miss the July 8th ad closing date. Call Terry Williams at (617) 965-5800 to reserve space for your ad.

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Companies Crowd Computer Conference

Not all attendees were enthralled with technology.

NCC '77

A CW Photo Feature
By A. Dooley
R. Frank
And E.D. Lundell Jr.

"If you believe that, buy MSA software."

The galaxy was all inside.

The Queen's Jubilee spirit spills over to the Colonies.

Harris had the biggest booth – front and center.

People, People, People

Calcomp's vision was peripheral.

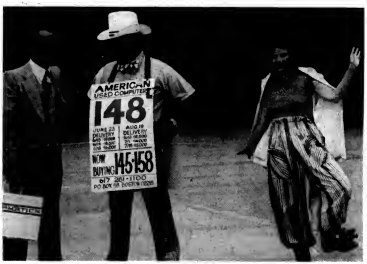
What is the question? Hazeltine asked.

Through the Adds Hole

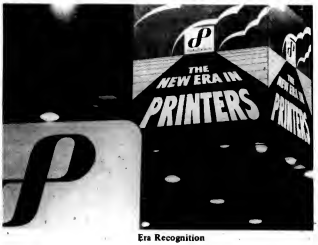
Honeywell's fox guards the coop.

It slices, it dices . . .

Ball's booth was ajar.



Would you buy a CPU from this clown? woman on the right asks.



Era Recognition

And If I'm Elected . . .

Jacquard put on the dog.

"How long do I have?"

For Software Development

Climate Outweighs Method: Yourdon

By Esther Surden
Of the CW Staff

DALLAS — Software project managers have a great number of development methodologies to consider when implementing a project, but all of these methods — from structured programming to IBM's Hipo — require an analysis of the climate of implementation, according to Edward Yourdon, chairman of the board of Yourdon, Inc.

Speaking on "The Choice of New Software Development Methodologies for Software Development Projects" at the National Computer Conference last week, Yourdon said that trying to implement all of the available methods "will generally result in disaster."

Therefore, users should try just two or three to begin their efforts, he advised.

Techniques that involve organizational change are often the most difficult to implement, he said. Even something as simple as appointing a program librarian to take over some of the troublesome programming tasks from the programmers causes difficulty because people don't like organizational change.

"Take into account the organizational climate of your organization," he told session attendees.

The program designers should also be careful of failing to take an overview of the project. Three or four years ago when structured programming became popular, many users tried it only to be disappointed, he recalled.

Top-Down Approach

"A perfectly well-structured program in an unstructured project performing a task the user never wanted" to begin with is "not impressive," Yourdon said.

The top-down design and implementation approach is often a good way to introduce structured methodology without upsetting the organization, he recommended.

It tends to produce a "reasonably modular system" and accomplishes what companies call "structural analysis."

"As we all know, it's very difficult to measure software projects," Yourdon continued. "With the top-down approach we can measure in terms of milestones or, as my colleague . . . refers to them, inch pebbles," or small milestones, he stated.

An approach that includes informal walkthroughs is often the most successful one, Yourdon noted. Firms that begin with this informal procedure can introduce the concept of people looking at other people's product.

Without the walkthroughs, users "run the risk of having each member of the team see structured programming differently," each devising a group of unrelated modules, he said.

The project director may also have to worry about the political climate, Yourdon said. In a large organization the implementation of new techniques may be considered "almost as a research project." However, "you may be in a position that you don't want to be a guinea pig," he added.

The manager should also ask himself whether the team has the technical ability to take on the new approach and if the individuals have a history of being able to work together, Yourdon said.

CW Photo by A. Dooley

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Univac's Gusher Cultoon meets his computer date.

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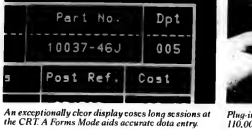

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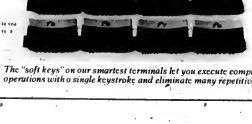

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Self-Adaptive Data Bases Promoted as Boon for DBAs

By Molly Upton
Of the CW Staff

DALLAS – Self-adaptive data bases can make life easier for the data base administrator (DBA), according to panelists at a National Computer Conference session on "Self-Organizing/Self-Optimizing Data Bases."

However, such data bases do not eliminate the need for the DBA. His role is still vital for the input he can provide on the future needs of the organization using the data base, the panelists agreed.

Dr. Michael Hammer, associate professor of MIT's laboratory for computer sciences, said his group has developed a Datacomputer, a mechanism that can select a nearly optimal design of a particular data base.

Datacomputer is available on the Arpa network and is accurate to 5%, he said. In 90% of the cases, the mechanism selected the "optimal" scheme, whereas the others were only 5% from optimal, he added.

The day of self-organizing data bases is coming soon, Hammer said, and several commercial data bases are studying how to incorporate the concept.

A real problem is the tendency to alter data bases as a result of information indicating past rather than future demands on the system, Hammer said.

This is where the DBA can play a key role in not only assigning priorities to some functions, but also in assessing the validity of the system's findings.

Physical designs of data bases should be separate from logical designs, Hammer said, and the organization of data should not affect the way users access the base.

The physical design of a data base is not a "one shot" affair, since the base has a life cycle of its own reflecting usage patterns, he said, noting data characteristics can also vary.

Designing a data base is a complicated problem, Hammer stressed. It is difficult to get an accurate global usage pattern. Even if one knows what the use of the system is, it's hard to evaluate the design and even harder to figure out a design for the future, he added.

However, semiautomated data base design – a set of tools to assist the DBA in performing design – can be useful because the system is the best source of information on usage and data, he said.

Design Evaluator

The basic components of an automated or semiautomated physical design system are a design evaluation module and an information gathering module, Hammer said.

The latter collects information on the use of the data base and its contents, which are then assessed along with a proposed physical design by the design evaluator.

In order to expedite matters, transactions are categorized into classes with all items within a class assumed to require the same amount of processing by the data base management system (DBMS).

However, he noted, the information gatherer should not degrade DBMS performance.

The evaluator is built around a transaction cost estimator (TCE), which reflects the cost that would be incurred in processing the transaction if the data base were structured in the proposed way, Hammer explained.

The TCE also assigns a cost for overhead items such as storage.

One can then take the proposed design and "smash it against" the usage pattern as collected by the system, Hammer continued.

The TCE can be of interest in its own right, he noted, since it can smooth user interaction by indicating, for example, how long the system will take to find a particular inquiry.

In order to avoid redesigning, "just in time to find you're left out in the cold" with an obsolete system, an adaptive redesign capability is needed that can, if desired, alter the base frequently, he said.

Moreover, there should be a predicator module to give an indication for future needs, he said.

A design proposer module can employ heuristics to synthesize a manageable number of designs, he said.

Dr. Peter Stocker, professor at the University of East Anglia in Norwick, England, has been working on self-organizing data base systems since 1973.

He said he now thinks the ultimate place for such a system is a back-end processor, and the University of East Anglia is implementing a system on a minicomputer that it plans to link to the larger CPU.

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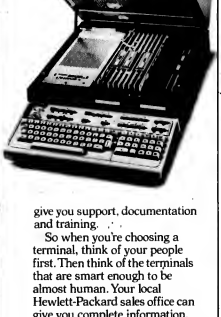

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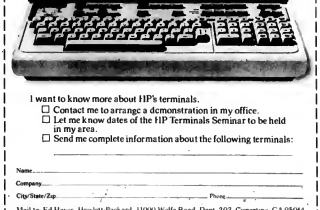

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And Harris Debuts Three Units

IBM-Compatible Memories Draw Large System Users

By Frank Vaughan
Of the CW Staff

DALLAS — IBM-compatible memories for the 370 line sparked the major large system interest here at the National Computer Conference last week.

In addition to that peripheral action, one firm — Harris Corp. — used the show as the launching pad for three medium-sized systems.

Both Memorex Corp. and National Semiconductor Corp. introduced IBM 370-compatible memory systems at the show.

Memorex featured an add-on memory unit that utilizes an 8K dynamic chip. The 6358, which replaces Memorex's 6258-1 add-on for the IBM 370/158, is basically a 6258-1 with 8K chips.

The chip is transparent to the IBM processor, according to a spokesman for the Santa Clara, Calif. firm. It is 150 nsec memory that is compatible with the IBM CPU clock.

The purchase price of a 1M-byte memory is $77,000, the cost of a 24-month rental is $3,370/mo. The memory is available in 512K-byte increments, the spokesman noted.

Another memory offering by Memorex was the 6400 family, which will allow users to install up to 4M bytes in a single frame. It replaces Memorex's 6235 and 6145 memories, which were designed for IBM 370/135 and 370/-145 users.

The memory will attach to either processor, with a field-installable interface change required when processors are upgraded. The memory is also compatible with the 135-3 and 145-3, according to the spokesman, and is based upon a 4K static chip.

Static RAM

National-Semi took a slightly different approach at NCC, announcing one system that bridges the entire 370 line from the 135 to the 168 with a memory based on 4K static random-access memories (RAM).

The Bridge Memory System contains up to 2M bytes in one cabinet, but a system can be configured with up to 16M bytes, the firm said.

The unit features a systems access of 110 nsec at the board level, which is fast enough for the 135

CW Photo by A. Dooley

National answers McDonald's.

and 145 that have bipolar memory in the IBM versions. The interfaces for the other systems in the line slow the memory down to the IBM times, a spokesman said.

Could Ella break this?

CW Photo by R. Frank

National Semi will not market the system directly to end users, but Itel, which will market it, said a typical 512K-byte memory for a 135 will cost $140,000 and a 1M-byte system for a 145 will run $250,000.

All of the systems can be field-upgraded to a larger CPU in the IBM 370 line by changes to the interface, the vendor added. National Semi is based in Sunnyvale, Calif.

System Offerings

Harris offered three systems in the firm's Series 100.

System 135, the largest of the three offerings, features a 300 nsec processor that can support over 50 terminals in a multiterminal commercial/scientific application.

The processor comes with 325K bytes of MOS memory that is expandable to 750K. In addition, 12M bytes of virtual memory can be utilized through the Vulcan operating system.

A typical 32-user System 135 configured with 480K bytes of memory, scientific arithmetic unit, a 1,000 card/min card reader, a 900 line/min printer, 600 million bytes of disk storage, two magnetic tape units and 32 CRTs costs approximately $425,000.

The System 125 from Harris is capable of supporting up to 32 interactive terminal users. It has a 300 nsec processor with 144K bytes of MOS memory, expandable to 624K bytes; 3M bytes of virtual memory can be utilized with the system.

A typical 16-user System 125 configured with 336K bytes of MOS memory, a 600 card/min card reader, a 600 line/min line printer, scientific arithmetic unit, 150 million-byte disk, 16 CRTs and one remote job entry link is priced at approximately $260,000.

The System 115 is the smallest of the three Harris offerings and was designed for distributed processing applications that require multiuser concurrency. It also has a 300 nsec processor with 144K bytes of MOS memory that is expandable to 192K bytes.

The processor can support up to eight terminal users while simultaneously communicating with another remote Harris, IBM, Control Data Corp. or Univac mainframe, the firm said.

A typical System 115 configured with 192K bytes of MOS memory, a 300 card/min card reader, a 300 line/min printer, additional disk storage unit, four CRTs and a remote job entry link is priced at $130,000.

Independent Disk

Six models of non-IBM disk packs were also announced by Memorex: Mark VIII, a 50M- or 80M-byte pack for California Computer Products, Inc. T50/T80 or equivalent drives; Mark XIIC, a 200M-byte pack for CDC 9780 and NCR 658-201 drives; Mark XIIH, a 200M-byte pack for the CDC 9762 and Memorex DM 980 drives; Mark XIV, an 80M-byte pack for the CDC 9762 and Ampex DM 980 drives; and the Mark XV, a 300M-byte pack for the Calcomp T-300 and Ampex DM 9300 disk drives.

The Santa Clara, Calif. firm said deliveries of the packs will begin immediately for all models except the Mark VIII and the Mark XV, which will start in the third quarter. Prices begin at $385 per pack.

OEM Word Processor

Documation, Inc. introduced its DOC 5000 programmable word-processing system for OEMs.

The system consists of a CPU, IBM-compatible magnetic card unit, full-page CRT, keyboard and printer. Data that has been recorded on an IBM Mag Card II or on Mag Card A can be read into the DOC 5000, edited, recorded and played back on IBM equipment, according to a spokesman.

System software can be fixed or loaded via magnetic card. Each card can hold 8K bytes of program. The DOC costs less than $7,500 from the Melbourne, Fla., firm.

Electronic Memories & Magnetics Corp. (EMM) announced a disk drive at NCC that utilizes both fixed and removable media, offering users 25.46M- to 305M bytes of storage, according to a spokesman.

The drive records 370 track/in. with a recording density of 4,600 bit/in. The fixed disks are IBM 3330-II types and the cartridge is a 5440 type with a 3330-II-type disk.

A Model 312, with one cartridge and three fixed disks for 76.41M bytes of storage, costs $6,400. Shipments will start in the first quarter of 1978, according to a spokesman for the San Jose, Calif. firm.

Color Plotter

A color plotter was introduced by Application, Inc., a Burlington, Mass. firm. The plotter utilizes ink jet on rotating drum technology.

The unit has an image resolution of 127 point/in. and can produce a maximum image size of 22- by 34 in.

A magnetic tape unit is also available for the unit. It has an 800 bit/in. recording density on 9-channel media.

The plotter, with magnetic tape unit, costs $37,500. Customer shipments will begin in October.

CW Photo by E.D. Lundell Jr.

Outasight attendees eye Omega.

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CW Photos by A. Dooley

Options Grow for Small Business, Distributed Users

By Esther Surden
Of the CW Staff

DALLAS – Users of small business systems and distributed processing units were presented with varied offerings at the National Computer Conference here last week as the minicomputer vendors displayed their wares.

Leading the distributed processing parade, Four-Phase Systems, Inc. expanded its product line with the System IV/90, its top-of-the-line system that features Vision software, a multifunction, transaction-processing package that provides concurrent access to local files and a central data base.

The system was designed for high-volume transaction processing in the remote branches of decentralized organizations.

Two models were introduced. The Model 1 has 96K bytes of memory and utilizes the same operating system as previous Four-Phase systems. The Model 2 can handle up to 192K bytes of memory and features two to eight times the throughput of the previous high-end processor, a spokesman claimed.

The Model 2's operating system is different than that of the rest of the firm's product line, but the change has been "made as transparent as possible to the user," the spokesman said. Present users who upgrade to the Model 2 may have to compile or link-edit their programs again, he added.

The System IV/90, available in July, communicates with a host system or other remote Four-Phase systems at up to 9,600 bit/sec. A 16K intelligent communications controller, also announced for the IV/90, supports both IBM Binary Synchronous Communications and Synchronous Data Link Control line disciplines.

The Vision software can be used on all the firm's systems. It accommodates multiple operators, multiple jobs and multiple functions simultaneously on the same system.

The company also introduced Foreword, a shared-logic word-processing system that can support up to 16 CRTs and 16 printers. Built around any of the firm's processors, the software supports up to four on-line disk drives that can contain up to 40,000 pages of text, the company claimed.

Four-Phase primarily leases its systems. The IV/90 with 12 1,920-character, dual-intensity displays, 192K bytes of memory, two 67.5M-byte disks, a 600 line/-min printer and the Model 8437 communications controller costs $3,387/mo on a 42-mo lease including maintenance and software.

The Vision software is available without charge to all users, the company added.

Monthly rental for a four-station Foreword system with two 400-page disks, two printers and a communications controller is $315/station, Four-Phase said. The firm is based at 19333 Vallco Parkway, Cupertino, Calif. 95014.

'How Small Is Small?'

When it came to small business systems on the NCC exhibit floor, users could well ask, "How small is small?"

A case in point was General Automation, Inc.'s entry, the GA-16/550, a dual-processor system said to be in the range of the Digital Equipment Corp. PDP-11/70 and Data General Corp. Eclipse.

The 16/550 extends the firm's Solution series upward. It is based on a shared-processor technology featuring what GA termed a "shared cache bus" that connects up to eight processors to a ported money facility.

A single cache bus can transfer data between as many as four processors and four memory banks at rates of up to 8M byte/sec, GA claimed. A parity-per-byte system protects the integrity of data transfers, the company noted.

The 16/550's CPU is a microprogrammed unit with a 240 nsec micro cycle time. It features a 2K-byte, 120 nsec cache memory; 1K words of 64-bit control store, expandable to 2K words; and 145 basic instructions.

In addition to the large system, GA brought out a smaller one based on its earlier 220 CPU. In the range of the DG Nova 3 and DEC PDP-11/04, GA-16/330 can handle up to 128K bytes of memory and includes slots for eight I/O cards "for interfacing that previously would have been implemented externally," the spokesman said.

A GA-16/550 with dual cache bus, dual processors and 500K bytes of memory with error correction costs "less than $50,000," according to the spokesman. The 330 with 16K words of memory costs about $6,800.

The Hypak memory on the 16/550 can accommodate 256K bytes on one board; previously the firm could offer only 32K bytes of core or 64K bytes of semiconductor memory on a single board, the spokesman said. The memory costs about $17,000 for 256K bytes with error correction for the 16/550.

For the 330, 128K bytes of memory costs about $9,000. General Automation is located at 1055 S. East St., Anaheim, Calif. 92803.

Three From Datapoint

Another of the distributed systems vendors, Datapoint Corp., brought three systems to the show, including its 6600 Advanced Business Processor, a CPU that extends the firm's product offerings upward.

The 16-bit 6600 system can accommodate up to 120K of user memory and features faster memory speed than the firm's earlier 5500 and an enhanced instruction set. It is said to be compatible with other Datapoint systems on both the software and peripheral level to give users "a very substantial processing boost without rewriting programs," according to a spokesman.

The 6600 can be used both in standalone mode and as a host in a network. Used as a host system under the Datashare operating system, it can support up to 24 CRTs, the company said.

Each of the CRTs can direct the execution of the same or different programs concurrently, the firm noted, and under memory partitioning software the system can batch to a remote site simultaneously.

The 6600 with 5M bytes of disk costs $32,500 or $1,240/mo on a three-year lease.

Datapoint also announced the 1170 Dispersed Processor, a diskette-based system designed around the 5500 processor. The system features a keyboard and display with program-loadable character set; it can accommodate two to four diskette drives and supports up to four different users, the spokesman said.

A four-drive 1170 system costs $17,180 or $517/mo on a three-year lease.

The 1170 runs a diskette-based, multiuser multitasking operating system called DS41170 Business Time-Sharing System, also introduced at NCC.

The software is said to provide all the features of Datashare 4 with enhancements to allow the system to be used in a multidropped telecommunications environment.

The DS41170 interpreter can accommodate up to four user programs simultaneously with concurrent communications.

The firm is located at 9725 Datapoint Drive, San Antonio, Texas 78284.

Beehive International launched a series of small business systems at NCC with the introduction of its Beehive Office Supervisory System (Boss), based around the firm's 8800 integrated minicomputer and CRT.

Designed for first-time users, the system costs $25,000 to $75,000, the firm said, and is in the range of systems from Basic/Four.

The CPU is compatible with the DG Nova and is housed in a 9-slot chassis with a memory controller, two slots for up to 32K memory and a display controller. Four spare slots can be used for peripheral controllers to drive anything from a floppy disk to multiple cartridge disk drives and magnetic tapes, the company stated.

Running under Beehive's own operating system, the unit features an extended version of Business Basic and a file management system "capable of handling multiple directories using different key fields on a single indexed sequential data file," a spokesman said.

Another system feature allows the Boss to be attached to an external I/O chassis for expandability

A basic system with dual floppy disk drive, 32K of memory, 165 char./sec matrix printer and operating software costs about $25,000. A larger 32K system with a workstation, one 10M-byte drive, one expansion chassis and a 165 char./sec matrix printer costs about $75,000.

Beehive is located at 4910 Amelia Earhart Drive, Box 25668; Salt Lake City, Utah 84125.

Minis Get CCD Memory

By Esther Surden
Of the CW Staff

DALLAS – One of the first charge-coupled device (CCD) memories for minicomputers to be commercially available was announced by Alpha Data, Inc. at the National Computer Conference here last week.

Called the CCDisc memory, the device was described by the firm as a "disk that doesn't rotate."

Featuring an average access time of 250 microsec, which the vendor said is almost 40 times faster than electromechanical rotating disk memories, the system is targeted for fast buffer, paging, program swapping, time-sharing and distributed network applications.

The CCDisc unit uses 128K-byte plug-in printed circuit memory boards. A single system can mount eight of the boards for a total capacity of 1M bytes. More memory boards can be added in the field and capacities of up to 4M bytes can be achieved by daisy chaining, the company stated.

The memory's interface is plug-compatible with all Alpha Data computer controllers as well as all of the firm's rotating head-per-track disk memory electronic interfaces. The CCDisk interface can also emulate the interface of other manufacturers' head-per-track disks, the company noted.

The system is available with controllers for Data General Corp. and Digital Equipment Corp. minis as well as others. CCDisks will be available eight weeks after the order is received and cost $4,500 for a 1M-bit system.

Alpha Data is at 20750 Marilla St., Chatsworth, Calif. 91311.

Network Fault Isolation Gear Paraded at Dallas Show

By John P. Hebert
And Ronald A. Frank
Of the CW Staff

DALLAS – Users concerned with communications network fault isolation were treated to a number of product introductions at the National Computer Conference here last week.

Atlantic Research Corp. announced a test system emulator for its Intershake tester that allows network nodes to be exercised with the software emulating the host CPU or the front end. This off-loads the testing burden from the operating system, according to a spokesman.

For remote testing, the Intershake-Interview test system is said to control the modem for switched carrier applications with point-to-point and full-duplex capability built in.

Forced error conditions can be introduced with the software to authenticate error recovery procedures, the spokesman said.

The test program can be run in either an automatic mode to eliminate the need for assistance by a test operator or an interactive mode for "extensive" fault analysis by displaying protocol details, he added.

A single operator can control the test and operate the terminal when the Intershake test set is located at the terminal.

The testing software operates with both the IBM 3271 and 3275 protocols, using either Ebcdic or Ascii character sets. The programs are available in firmware, which can be field-edited to change addresses, thresholds and other parameters, he said.

The Intershake-Interview emulator program reportedly includes performance measurement in teleprocessing systems with preset thresholds for real time throughput studies, response time for individual terminals and similar functions.

The software documentation is available at no charge for Intershake users while the firmware version costs $325.

Atlantic Research is located at 5390 Cherokee Ave., Alexandria, Va. 22314.

Spectron Corp. unveiled a remote tone control unit (TCU) capable of performing switching and monitoring functions using the standard two out of eight tone codes employed by Touch-Tone telephones.

In addition, the company introduced a user-programmable interactive keyboard for its D-502 Datascope.

The Model 71 remote tone controller is designed to be used in conjunction with modem and line backup units. The TCU is capable of interfacing with up to seven modem backup units and up to seven line backup devices, according to a spokesman.

The TCU consists of a power supply board, processor/memory board and the telephone interface board.

The user-programmable keyboard addition to the D-502 Datascope allows its user to write a program using standard alphanumeric characters on the keyboard rather than writing a diagnostic program in hexadecimal code on the communications monitor, the spokesman said.

The keyboard includes a full cursor control capability, among other features, and costs $800 from Spectron in Mt. Laurel, N.J. 08057.

Storage Enhancement

Digi-Log Systems, Inc. introduced Tapetrap, a 1M-char. capacity storage enhancement to its Data Line Monitor (DLM-II).

The user-programmable subsystem provides unattended diagnostic and recording capabilities of data and control characters equivalent to an hour of communications traffic transmitted at 2,400 bit/sec, according to a spokesman.

Tapetrap can be set to automatically record a single track or a full tape or to record continuously from lines transmitting data at speeds up to 9,600 bit/sec, the spokesman said. The user-programmed trap sequence of up to 16 char. is used to either start or stop the recording process on detection.

A trip flag and at least 256 char. on both sides of the trap sequence is recorded automatically each time the sequence is detected, he added.

Tapetrap is priced at $3,450 and first deliveries are scheduled for this July, according to the firm, located in Horsham, Pa. 19044.

Floppy Disk Terminal

The Teledisk Model 2020 mini floppy disk terminal introduced by Research, Inc. is a communications storage device intended for plug-compatible attachment between asynchronous Ascii printers or display terminals and their RS-232 modems.

After a message has been stored on Teledisk, it can be displayed or printed on a local terminal or transmitted to a remote location, according to a spokesman. The device can also be used as an auxiliary storage device or high-speed program loading device for a minicomputer.

Up to 71.68K char. can be stored in the terminal, which is a microprocessor-based unit featuring 15 switch-selectable transmission rates from 50- to 9,600 bit/sec.

Teledisk is equipped with a number of front-panel switches for program reload, program interrupt, transmission mode, operational mode.

Research is located in Minneapolis, Minn. 55424.

Dynatech Data Systems unveiled its Econoline 24-circuit patching system, which provides an economical means to access and manage the EIA interface between communications equipment, according to a spokesman.

Econoline was designed as a series of modular plug-in jacks plus a test/monitor position.

The rack-mount unit costs $1,260 from the firm at 900 Slaters Lane, Alexandria, Va. 22314.

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Multiapplication Displays Prevalent

Micro-Based Units Dominate Terminal Introductions

By John P. Hebert
And Ronald A. Frank
Of the C W Staff

DALLAS — Microprocessor-based intelligent terminals dominated the communications product introductions at the National Computer Conference here last week, and multiapplication display units proved the most prevalent.

Lear Siegler, Inc. led the terminal product introductions on the show floor — not only in substance, but in form as well.

Lear's VDP-1000 CRT (also known as the ADM-4) marked a departure from the terminal maker's previous "dumb" terminal series. The VDP-1000 has a 16-bit micro, can contain up to 32K words of memory and has a built-in Virtual Memory Operating System (Vmos).

The device is a user-programmable, multipurpose terminal/processor that comes with 16K words of memory and dual floppy disk backup storage.

Vmos automatically transfers routines and data to and from backup storage so the terminal's main memory appears considerably larger than it is, he explained.

The terminal communicates asynchronously in its standard form at speeds up to 9,600 bit/sec in half- or full-duplex modes. It can optionally be made to communicate synchronously, according to the spokesman.

In addition, Lear introduced the VDP-400, which is the first implementation of the VDP-1000 concept. The VDP-400 is a modular terminal system consisting of a detachable 120-key keyboard, 1,920-character CRT and standard 16K by 16-bit processor.

For standard terminal applications, the VDP-400 comes with 8K bytes of read-only memory (ROM) for the terminal program, plus 4K bytes of ROM for storage and display, which is expandable to 20K bytes, the spokesman noted.

The VDP-400 costs about $2,500, while the VDP-1000 is priced at "less than $7,000," he said. Much of the additional cost for the VDP-1000 is attributable to the extra software, he explained. Lear is located at 714 N. Brookhurst St., Anaheim, Calif.

Telex Terminal Communications of Raleigh, N.C., introduced the TC 277/4 keyboard/display terminal, available in two models, and the TC 271/4 control unit for the TC 277/4.

In addition, the company announced an IBM Synchronous Data Link Control (SDLC) capability as well as Binary Synchronous Communications for the TC 241 and 3270-compatible product line and said it has reduced rental and purchase prices for the 3270-compatible line.

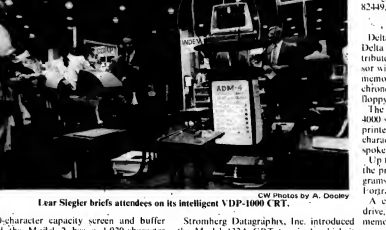
The TC 277/4 is an IBM 3277-compatible user-oriented CRT terminal with a detachable, optional keyboard. The Model 1 has a 480-character capacity screen and buffer and the Model 2 has a 1,920-character screen capacity and buffer, a Telex spokesman stated.

A cluster of eight TC 277/4s can be connected to one TC 271/4 control unit, he said, adding each terminal can be located up to 2,000 feet from the controller.

Three choices of keyboards are available with the terminal, which communicates at speeds up to 9,600 bit/sec. The 277/4 costs $1,590 and the optional keyboard is priced at $310.

The 271/4 controller in its basic configuration costs $3,480, although it can be configured for connection of up to 12 terminal devices to a synchronous line. Standard transmission is at 7,200 bit/sec; 9,600 bit/sec transmission capability costs an additional $650.

Telex's TC 271 remote control unit was reduced about 17% on purchase price and an average of 35% in lease prices. The TC 277 series terminals were reduced 16% on a purchase basis and 2% on a lease basis, while the TC 275 stand-alone CRT prices were dropped 5% and 23% respectively.



CW Photos by A. Dooley

Lear Siegler briefs attendees on its intelligent VDP-1000 CRT.

Stromberg Datagraphix, Inc. introduced the Model 132A CRT terminal, which is billed as "the first of its type to display up to 132 columns of data."

The 132A interfaces directly to computer systems using the standard 132-column format. As such, a Datagraphix spokesman noted, it eliminates much of the reformatting required by displays limited to 80 columns and provides users with savings in printout, processing, communications and programming time.

The terminal projects preformed alphanumerics onto the display screen, rather than using dots or strokes for character formation.

The 132A CRT is microprocessor-controlled and includes a 96-character upper and lower case Ascii set, a 60- or 120-line buffer, a roll-up feature and asynchronous transmission in half- or full-duplex modes at speeds from 110- to 9,600 bit/sec.

The basic unit has 8K of buffer memory, with 16K optional. An optional RS-232C interface to a 132-column serial printer is also optionally available, according to the spokesman.

The 132A costs $3,950; one with 16K of buffer memory costs an additional $500; and the printer interface is another $150. Datagraphix can be reached at P.O. Box 82449, San Diego, Calif. 92138.

Delta Data Cluster

Delta Data Systems Corp. introduced the Delta 6500 cluster terminal system for distributed processing. It consists of a processor with up to 64K bytes of programmable memory, IBM 3780-compatible bisynchronous communications, printer and a floppy disk interface.

The Delta 6500 permits up to eight Delta 4000 series CRTs and two serial read-only printers to share access to up to 1.5 million characters of storage, according to a Delta spokesman.

Up to 32K bytes of additional memory in the processor can be used for custom programs, which can be written in either Fortran or Basic, the spokesman noted.

A cluster system with one floppy disk drive, a microprocessor with 32K bytes of memory, two terminals, one printer and communications up to 9,600 bit/sec costs about $15,000.

Delta Data is at Woodhaven Industrial Park, Cornwells Heights, Pa. 19020.

Adds Additions

The Regent 100 and 200 are two teletypewriter-compatible, microprocessor-based terminals introduced by Applied Digital Data Systems, Inc. (Adds).

The Regent 100 is a teletypewriter replacement; the Regent 200 is intended for the user with sophisticated data entry needs, according to an Adds spokesman.

Both terminals feature a 128-character Ascii keyboard with upper and lower case characters, a separate 14-key numeric pad and a line drawing capability on the 1,920-character CRT screen.

Infoton booth rounded out terminal exhibits.

An additional status line at the bottom of the screen shows the operating status of the terminal and the results of a self-diagnostic test of memory and the communications interface, the spokesman noted.

The 100 transmits one character at a time, while the 200 also provides two buffered transmission modes and a formatting capability. Transmission speeds from 75 bit/sec to 19.2 kbit/sec are switch-selectable, he added.

The Regent 100 costs $1,325; the Regent 200 is priced at $1,795. Adds is based at 100 Marcus Blvd., Hauppauge, N.Y. 11787.

Terminal Upgrades Few and Far Between at NCC

By John P. Hebert
And Ronald A. Frank
Of the C W Staff

DALLAS — Upgrades and enhancements to existing terminal products were few and far between on the sprawling exhibit floor of last week's National Computer Conference.

The introductions ranged from a programmable keyboard capability for Tektronix CRT terminals to an IBM-compatible software enhancement for an entire product line.

Tektronix, Inc. introduced a programmable keyboard capability for its 4014 and 4015 display terminals.

Called Option 40, the capability consists of two plug-in circuit cards containing a microprocessor, 3.25K bytes of random access memory, firmware, keyboard overlay and a minibus "extender" to operate 4014 communications interfaces.

Option 40 distributed graphics and alphanumerics allow the user to utilize the expandable buffer in the terminal for local storage of graphic symbols, special character sets, entire displays and constant background graphics such as overlays and labeling, according to a spokesman.

The stored information can be called out and instantly displayed with one or two characters from the keyboard or host CPU, he claimed.

The instantaneous call-up of complex graphics means reductions in data transmission and on-line time plus operating characteristics usually found in systems operating at 9.6 kbit/sec or faster, the spokesman said.

The keyboard capability also reportedly allows users to enhance alphanumeric operation by providing the capability to convert lengthy alphanumeric functions into one or two key commands on the 4014 terminal. Keys may be programmed to contain interactive menus, data entry forms, tabbing, program commands and similar instructions.

Option 40 costs "approximately $2,000" with first delivery scheduled for late 1977 from Tektronix, Beaverton, Ore. 97077.

Upgraded CRTs

Hazeltine Corp. unveiled two upgraded versions of its Model 1500 CRT communications terminal.

The Model 1520 offers its user increased function capabilities for protected and unprotected data; a horizontal tab and other tabbing functions; a set format mode; the ability to transmit one line of data or all or part of a page; as well as a terminal readstatus, a spokesman said.

In addition, the 1520 has been equipped with a printer interface for local or remote operation with either a parallel or EIA serial printer independent of the system transmission rate, he noted.

Like the 1500, the 1520 can transmit data asynchronously at speeds ranging from 110- to 19.2 kbit/sec. It has RS-232C and current loop interfaces and can display 95 Ascii char. in a 7 by 10 dot matrix format.

The Model 1510 differs from the 1520 in that it does not have the printer interface, the spokesman pointed out.

Information on pricing was not available. The company is located in Greenlawn, N.Y. 11740.

Built-In Acoustic Coupler

Computer Devices, Inc. (CDI) came out with its planned addition of an integral acoustic coupler for the recently introduced Miniterm 1204, making it an automatic send/receive portable terminal.

The Miniterm 1205 with a built-in acoustic coupler automatically compensates for minimizing communications errors over ordinary phone lines, a spokesman claimed.

The Miniterm 1205 has a ruggedized construction and weighs 24 pounds with the carrying case. It costs $3,785 to purchase or $185 mo to rent.

CDI is located at 25 North Ave., Burlington, Mass. 01803.

Datapoint Corp. announced the availability of IBM software emulators for all of its existing data communications products, according to a company spokesman.

The software enhancement will allow the Datapoint equipment to emulate IBM 2780 and 3780 protocols in addition to emulating IBM JES, RES and Hasp workstations, a spokesman stated.

The software capability is user-specifiable, according to the spokesman, who noted documentation is available to Datapoint users for $7.50, the price of the media.

Datapoint is located at 9725 Datapoint Drive, San Antonio, Texas 78284

Small Business Users Alerted to Potential MIS Costs

DALLAS – If you buy a $30,000 computer for your small business in 1977, expect to pay another $30,000 for the software and budget for an annual operating cost that equals the total price of your system.

That's the advice Frederick F. Newpeck, a professor at the University of New Mexico, gave to attendees of his presentation on "Computer-Based Information Systems for the Small Firm" at the National Computer Conference here last week.

Today, hardware costs are approximately equal to the software expense for a small business system. And annual operating costs, including people, paper and other supplies, will equal the total cost of such a system, Newpeck said.

The only purpose of a computer-based management information system (MIS) is to get an organization "back to the state of direct, entrepreneurial control," he noted.

An MIS "should increase the efficiency and effectiveness of the firm's communications system so the company can react to its environment as a single organism," he stated.

Advantages of Automation

Accordingly, if a firm's gross sales exceed $250,000 and/or three to five clerical people are employed, the company should consider automating its primary business functions, Newpeck said.

A small business might automate because its operation is seasonal, requiring a huge clerical effort in a small time period, he explained.

An organization largely dependent on one person and facing a short skilled labor supply might look to computing as a means of reducing the complexity of its manual system, he added.

Still other reasons why small firms decide to invest in business systems are their needs for more accurate and timely data and for sophisticated management information.

The ability of the MIS to give a small company's management cost and performance analyses of products, activities and personnel, controls over inventory and analyses of sales and cash needs is the chief payoff of such a system, Newpeck maintained.

Automation permits small businesses to implement the data base concept: entering data once to be used for several purposes; reducing the "goal conflict" that may easily arise among the various divisions or functions running the business; and increasing the personal freedom of all employees whose jobs may be eased by the system, he suggested.

Efforts to implement small business systems fail because of poor management structures where management resources are limited and responsibilities are confused, Newpeck said.

MIS implementation also goes awry when top management fails to become involved in the system's development or when an organization lacks computer expertise.

Newpeck laid the final reason for MIS failure at the doorstep of customized software. Few small firms have the capital resources to support a customized system design process, he said.

Documentation of customized software is a major problem, he added, noting that unique, poorly documented software ties a small user to anyone within his firm who understands it.

His advice to firms looking for software for their systems is to fit the company's operations to a standard package wherever possible. Make software changes only after three months' use, he suggested.

When acquiring hardware, nothing can replace a management that is aware of computers, their benefits and costs, Newpeck said. He urged his audience to "hire a consultant" if there is no in-house computer expertise.

Any consultant should have specific references from other firms not unlike the small business hiring him. And "be sure the consultant acquires a good knowledge of the business you wish to automate," Newpeck urged.

Write general functional specifications for the system based on a clear objective of what it is designed to automate, he added.

These specifications should be sent to the vendors who propose to fill the small firm's needs. The user company should ask each vendor how many similar installations it maintains, what kind of maintenance organization it has and how its maintenance personnel were trained.

It should also ask what the terms of the purchase are and what warranties the vendor is willing to make, Newpeck advised.

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Risk Assessment Outlined

Parker Hits Security Specialists for Lack of Progress

By Nancy French
Of the CW Staff

DALLAS – "After hearing the papers on computer security presented at last year's National Computer Conference and having heard the ones presented today, I would conclude that we haven't made any progress this year," one NCC attendee said from the audience here last week.

The attendee was Donn Parker, a computer fraud specialist who offered his observation at the conclusion of two papers on the subject of risk analysis.

Parker then pointed out that common to all systems of risk analysis recommended by panel members was the concept of a risk assesment "team" made up of key members of the company.

Such a team approach would give a relatively large number of a firm's employees a virtual inventory of all the computer's vulnerable spots, he said.

This is a sure way to make a company more susceptible to fraud, he suggested.

Panel members agreed with Parker's general point and proposed that risk assessment team members participate in detailed analyses only on a need-to-know basis.

Panel chairman Rein Turn, a staff engineer in the software analysis and evaluation department of TRW's Defense and Space Systems Group, countered Parker's original charge of no progress.

The fact that an increased number of users are actually using risk assessment to determine the vulnerability of their computer systems is an indication of progress, Turn stated.

Other panelists, however, agreed that more research was needed on the subject.

But beyond that, much of what was said here last week has been said before.

Among the problems identified by panel members was "getting management attention" to the problem of computer security.

Robert H. Courtney Jr., IBM's computer security expert, suggested the dollars and cents approach tends to work best. "Managemgnt wants to know what it'll cost them not to implement security," he said.

Thomas Q. Stevenson, of the Department of Agriculture, suggested that in light of today's emphasis on privacy and confidentiality, the "embarrassment factor" is another measurement that "gets management attention."

A third measure now under discussion at Rand Corp. is "economic utility," according to Turn.

Courtney suggested a common sense approach. "Dishonest people can't compete with incompetents when it comes to wrecking a system," he said.

Hazards to Consider

After incompetents and then crooks, the third most serious hazard is fire, he said. The fourth is disgruntled employees, he added, explaining that in contrast to the dishonest people, the disgruntled employee probably has no economic motive. "If you don't see what he did, he failed," Courtney said.

The risk factor, Courtney said, is the product of two numbers: the worth of the data and the probability that something will happen.

What is the dollar impact of data that is modified or destroyed?, Courtney asked. Because this is difficult to quantify to make judgments where small differences of dollar value are concerned, he suggested dealing only in powers of 10.

Your problem might be a $10 problem, he said, but it could be a $100 million problem if a 747 flies through the building where a large multinational corporation maintains all its records in a large centralized computer.

Courtney warned against protecting data from "a nuclear attack" rather than the more mundane occurrences, using as an example the third shift operator who drops a disk pack, making it necessary to go get the backup from off-site storage.

It makes little sense to send that operator on a 150-mile trip in his souped up car in the middle of the night for the company's only complete backup of an important file, he said.

There's actually far more risk of an auto accident than any problem that would require such an extreme data protection measure, he added.

Steve Glaseman, of The Rand Corp. of Santa Monica, argued that more attention should be paid to motivation of the potential intruder.

Glaseman suggested that users identify access paths into the system and estimate the dollar value of the data exposed if any one safeguard fails.

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Software Called Major Hurdle In Future Systems Development

By E. Drake Lundell Jr.
Of the CW Staff

DALLAS — "Programming these monsters of ours" will be the greatest limiting factor in the development of the systems of 1985, Dr. Herbert R.J. Grosch, president of the Association for Computing Machinery (ACM), said at a National Computer Conference panel session here last week.

And most of the other panelists in the high-powered session agreed that software is the major stumbling block in the computer field.

Technology will not limit the development of the next generation of systems, Grosch said, adding "we're not going to run out of goodies."

Rather, the interface between humanity and the "hard logic of the machines," as expressed in software, will be the major hurdle, because that interface will present "almost impenetrable barriers" of poor logic, redundancy and set attitudes, he explained.

Moving more functions into hardware won't help, Grosch said. "If you're asked to do an application on a chip, you're going to make erroneous chips" just like people make erroneous applications in software today, he claimed.

With distributed systems, the problem will even be greater, Grosch said. However, he added, there is no choice and distributed DP is coming.

But with such systems, Grosch predicted there would be "layers and layers" of software, which will hold back the move to distributed systems for 10, 15 or 20 years.

"And long before that happens, we'll have billion-bit chips and billion operations per second processors," he forecast.

Harlan Mills of IBM agreed, even though he said he didn't often agree with Grosch. "We are orders of magnitude away from what we want to do" in the software area, Mills said.

Software has been an afterthought to hardware in the computer community. Even worse, maintenance of software has been an afterthought to the development of software, he added.

CW At NCC

"No longer is applications development the problem," he said. "We're being strangled by maintenance" since three times as much is being spent on maintaining old programs compared with the expenditures for new development.

Problem of Complexity

The largest problem with software, Mills stated, is its complexity, which can't be measured in any meaningful way today. A possible measurement for software complexity could be that "the complexity of any program that solves a problem is as great as the problem itself," he said.

At the same time, the problems in the software area have taken on a greater and greater importance in recent years, he said, since developed societies rely so heavily on DP.

Because of this, software should be viewed as a natural resource, he added, and people should realize that there is a great social cost in the maintenance of old, unworkable software.

Corporations Faulted for Failing To View Data as Vital Resource

By Don Leavitt
Of the CW Staff

DALLAS — Corporations still do not really view data as a resource nor do they view the data base administrator (DBA) as the manager of a valuable corporate resource, according to Prof. Jean-Paul De Blasis of the Centre d'Enseignement Superieur des Affaires in France.

The DBA is a necessary part of any data base management system (DBMS) effort, De Blasis acknowledged, and no corporation should attempt to form a corporate data base without this individual or group to manage its internal operations.

But the DBA is not the policy-maker that much of the early literature on DBMS foresaw, he told an overflow session the first day of the National Computer Conference.

De Blasis made the comments in summing up a survey of DBAs working in a number of U.S. corporations. While at the Wharton School of the University of Pennsylvania, De Blasis and Thomas H. Johnson undertook the study to see how well the reality of work in the field matched the expectations of the literature, he said.

The DBAs they surveyed were the highly qualified technical teams or individuals that first bring a new technology to bear on DP problems and then make the technology operate with the maximum efficiency possible.

"They are in a unique position of bridging various applications and have an extraordinarily difficult time bringing the available capabilities to potential users," De Blasis noted. "But they seem to perform this job reasonably well."

Despite the range of applications, company sizes and the specific DBMS being used, the researchers found "remarkable similarities" among the approaches, problems and successes of the DBAs they studied. As the study began, De Blasis added, they uncovered another "framework" which shed "considerable light" on the DBA.

This framework involves a definite maturing of the DBA function within an organization. In fact, they were able to identify five stages in the evolution of the DBA function: introduction, initiation, integration, operation and maturation, he told the audience.

The introductory stage may have changed over time, De Blasis stated. Early users of DBMS "seemed to discover the need for a DBA after using a DBMS" while more recent users have tended to discover a need for the DBA in parallel with or preceding the DBMS itself, he said.

Initiation of a DBA consists of developing one or two data base systems. It is in this stage, "lasting one or two years," that the DBA spends "a considerable amount of time and money" to establish a base for future growth," according to De Blasis.

Correct choice of system, personnel and applications are critical here, he added.

Integration "the joining of several systems together into the corporate data base" — is a development phase of "several years duration," De Blasis explained. "It never really stops," he added, but the study seemed to suggest a point at which "maturity" sets in. That happens when the DBA has control of the data base's definition, design, access and standards, along with having a large majority of the organization's applications on the DBMS," he said.

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Rx for DP's Future in Medicine: Aid or Substitute for Doctors?

By Ann Dooley
Of the CW Staff

DALLAS — The probability of computers becoming the doctors of the future was debated at the National Computer Conference here last week by a group of doctors and health educators.

The panel could not agree on whether computers will remain as an aid to the medical practitioner or whether they will make doctors obsolete.

Within the next 50 years, the paramedic and the computer will have created a "post-physician era," according to Jerrold Maxmen, assistant professor of psychiatry at Albert Einstein College of Medicine. The medic will do the routine and human interest work and the computer will do all the technical tasks, he said.

Computers will eventually outperform doctors on a technical level and this "can, should and will happen," he claimed.

Doctors now have to spend at least eight to 10 years studying medicine; much of this is casebook work for which the computer could be used, he explained. Medics then would probably have to spend only about 12 to 18 months in training, Maxmen said.

On a political level, physicians have always been able to control health care because they are a select group which possesses all the knowledge. But under the new system, this knowledge would be generally available through a computer, he said.

End to Doctors

Maxmen contended that the obsolescence of doctors is bound to occur for several reasons, one of which is legal responsibility. Someday, if a computer is not consulted in a diagnosis, it could lead to a malpractice suit, he said. The computer diagnosis will become the standard of care, he added.

In addition, doctors will be finding themselves performing tasks that a computer can do more accurately and they will become resentful and dissatisfied, he said.

Another reason for the eventual change is that even though computers seem strange now to the public, in 50 years they will become commonplace, Maxmen said. But if the medical profession doesn't accept the realities of the situation, the public will become confused and more distrustful of any change whatsoever, he said.

Different Protocols

Ben Williams, director of the pathology department at Mercy Hospital in Urbana, Ill., agreed that today's doctors will be obsolete in 50 years. The medical profession will naturally progress: "I wouldn't want to be treated today by a doctor from 50 years ago," he said.

In the future there will be a different protocol for each complaint, Williams predicted. A medic will examine the patient and use the computer to diagnose treatment based on rigid sets of rules.

"Some brilliant medical programs have been developed for treatment by computer, but there are not many yet," he said.

The reasons for this lack are the predominance of trivial, infrequently occurring problems entered into available data bases; the scarcity of easy-to-use, multipurpose terminals; and the failure to use computer-based medical care systems with functions such as billing, medical record systems and other routine applications, he said.

Another reason has been the failure to develop manageable clinical data bases, he added.

"The medical bite has gotten bigger," according to John Luckmann, director of the communication and simulation unit of the Department of Family Practice at the University of Iowa and another proponent of computer-based medical care.

Although spending has risen from 5.7% of the gross national product 25 years ago to nearly 10% today, less than 1% of the medical dollar is going toward automation, he noted.

In addition to increasing the dollars spent on computers, medical training should include "hands-on" experience with the clinical use of computers, he said.

"It is cheaper to ship medical expertise to where it's needed than to ship a patient to a medical center," he said. What's needed is a computer network, he added.

CW At NCC

Not to take advantage of computer aid would be "unethical" since it would make the patient the "innocent victim," he said.

Limited Help

"I am at opposite ends of the philosophical spectrum from Maxmen," Daniel Harris, director of computer systems in medicine of the American Medical Association, said.

Computer consultation should not be the same as medical consultation, he said, adding it also shouldn't be implied that a computer alternative is the only one or the best.

Computers can expand the medical fact base, help in certain evaluations such as dietary ones and also aid patient scheduling, he said, but the fundamental process should be one of information exchange and analysis.

Technology should be "additive in nature," not used as a replacement for clinical judgment, he contended. The responsibility of medical decision making should not be placed upon a nonphysician with medical automation support mechanisms, he emphasized.

Computers are "amoral" and are not responsible for their actions or behavior, he added, but they should be used to extend physicians' talents for personal care.

Physicians will not hold back computer-aided medicine, Dr. Robert Rakel, vice-president of the American Board of Family Practice, argued. "Anything that would be of help to the physician would be greeted eagerly," he said.

Computers will replace some of the technical practices now used by doctors, but a preference for personal health care will always remain, he said.

The doctor must be well trained generally and have a knowledge of computers, but diagnosis is so subjective it will never be taken over by technology, he added.

Computers could be used in preventive medicine, such as health hazard appraisal programs, Rakel suggested. They can also be used for information storage and retrieval and for providing timely clinical reminders.

A national medical record would be of value to allow access to medical information records whenever and wherever an emergency might occur, he said. "I leave it to you computer experts to solve the other problems attached to such a record," he told the NCC attendees.

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On a political level, physicians have always been able to control health care because they are a select group which possesses all the knowledge. But under the new system, this knowledge would be generally available through a computer, he said.

End to Doctors

Maxmen contended that the obsolescence of doctors is bound to occur for several reasons, one of which is legal responsibility. Someday, if a computer is not consulted in a diagnosis, it could lead to a malpractice suit, he said. The computer diagnosis will become the standard of care, he added.

In addition, doctors will be finding themselves performing tasks that a computer can do more accurately and they will become resentful and dissatisfied, he said.

Another reason for the eventual change is that even though computers seem strange now to the public, in 50 years they will become commonplace, Maxmen said. But if the medical profession doesn't accept the realities of the situation, the public will become confused and more distrustful of any change whatsoever, he said.

Different Protocols

Ben Williams, director of the pathology department at Mercy Hospital in Urbana, Ill., agreed that today's doctors will be obsolete in 50 years. The medical profession will naturally progress. "I wouldn't want to be treated today by a doctor from 50 years ago," he said.

In the future there will be a different protocol for each complaint, Williams predicted. A medic will examine the patient and use the computer to diagnose treatment based on rigid sets of rules.

"Some brilliant medical programs have been developed for treatment by computer, but there are not many yet," he said.

The reasons for this lack are the predominance of trivial, infrequently occurring problems entered into available data bases; the scarcity of easy-to-use, multipurpose terminals; and the failure to use computer-based medical care systems with functions such as billing, medical record systems and other routine applications, he said.

Another reason has been the failure to develop manageable clinical data bases, he added.

"The medical bite has gotten bigger," according to John Lackmann, director of the communication and simulation unit of the Department of Family Practice at the University of Iowa and another proponent of computer-based medical care.

Although spending has risen from 5.7% of the gross national product 25 years ago to nearly 10% today, less than 1% of the medical dollar is going toward automation, he noted.

In addition to increasing the dollars spent on computers, medical training should include "hands-on" experience with the clinical use of computers, he said.

"It is cheaper to ship medical expertise to where it's needed than to ship a patient to a medical center," he said. What's needed is a computer network, he added.

Not to take advantage of computer aid would be "unethical" since it would make the patient the "innocent victim," he said.

Limited Help

"I am at opposite ends of the philosophical spectrum from Maxmen," Daniel Harris, director of computer systems in medicine of the American Medical Association, said.

Computer consultation should not be the same as medical consultation, he said, adding it also shouldn't be implied that a computer alternative is the only one or the best.

Computers can expand the medical fact base, help in certain evaluations such as dietary ones and also aid patient scheduling, he said, but the fundamental process should be one of information exchange and analysis.

Technology should be "additive in nature," not used as a replacement for clinical judgment, he contended. The responsibility of medical decision making should not be placed upon a nonphysician with medical automation support mechanisms, he emphasized.

Computers are "amoral" and are not responsible for their actions or behavior, he added, but they should be used to extend physicians' talents for personal care.

Physicians will not hold back computer-aided medicine, Dr. Robert Rakel, vice-president of the American Board of Family Practice, argued. "Anything that would be of help to the physician would be greeted eagerly," he said.

Computers will replace some of the technical practices now used by doctors, but a preference for personal health care will always remain, he said.

The doctor must be well trained generally and have a knowledge of computers, but diagnosis is so subjective it will never be taken over by technology, he added.

Computers could be used in preventive medicine, such as health hazard appraisal programs, Rakel suggested. They can also be used for information storage and retrieval and for providing timely clinical reminders.

A national medical record would be of value to allow access to medical information records whenever and wherever an emergency might occur, he said. "I leave it to you computer experts to solve the other problems attached to such a record," he told the NCC attendees.

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To Handle Information Explosion

Small Business Systems Seen Taking Over NCC by '80

By Edith Holmes
Of the CW Staff

DALLAS — Minicomputer- and microcomputer-driven small business systems supplied by a wide range of companies will convert many potential users to computing by the end of this decade and command 70% to 80% of the 1980 National Computer Conference program, panelists at this year's NCC predicted here last week.

The "information explosion," the pressures every business faces to comply with the reporting demands of the federal government and each organization's need to keep up with its competition are among the factors "forcing" the need for small business systems, according to Ryal R. Poppa, president and chief executive officer of Pertec Corp.

Today, there are roughly 25,000 computers costing less than $15,000 each installed in the U.S. The key to the continued growth of small business systems the price has to be cheap, Poppa told an audience of nearly 600 NCC attendees.

And the public needs to be increasingly aware of computing and its benefits, he added.

An automated computation are up $1.26 in the 1950s. Today the same task costs less than a penny and the expense associated with electronics continues to drop, Poppa noted. The industry looks ahead to "super" large-scale integration by 1980, he said.

The cost of peripherals is coming down, too, but not nearly at the rate that memory prices are descending. Eighty percent of the hardware costs of the typical small business system will be attributable to peripherals by 1980, Poppa predicted.

The Pertec executive hopes developments in computers for hobbyists and those for small businesses will meet each other halfway in the provision of "component computers" not unlike the stereo systems so widely available to the public today.

Micros by Mail

Another factor that will enable the growth of computing among small businesses will be the many ways in which basic systems can be delivered to users, Poppa said. The advent of computer stores represents a realistic trend in system acquisition for both hobbyists and small business enterprises.

Microcomputers, like the Mits, Inc. Altair processor, can be mailed to a user. In addition, service bureaus and programming houses are beginning to see the value in buying small systems and turning them over to their customers on a turnkey basis, Poppa said.

If small business system users are to be satisfied and their hardware is to be cost-justified, vendors must develop the capability of maintaining their equipment all over the country, Poppa stressed.

The on-line transaction system that will characterize small business systems can tolerate a distance no less than 50 miles from the nearest vendor maintenance center and a response time to any given problem of no more than four hours, according to Donald W. Fuller, president of Microdata Corp.

The ease with which a small business system can be programmed will also directly affect the cost of adding to or changing its applications software, Fuller said.

Users of such systems should make sure they have at least one person who can program their particular machines, and vendors should develop the capability for training their users' personnel, he added.

Need for Support

The small business user's need for software support and maintenance echoes the medium and large business users' demands for vendor attention, according to Richard J. Schineller, acting president and executive vice-president for Sorbos, Inc.

A user can maintain its small business system itself or rely on support from its machine's manufacturer or from a third party, Schineller pointed out. With the trend to peripheral-dominated small business systems, users will have to develop some means of maintaining multivendor operations.

Communications facilities can bring diagnostic capabilities, off-testing equipment and redondancy safeguards to the small business user, Schineller said.

Not only most communications-oriented diagnostics happen soon on a wide scale, but they will help bring the cost of the small business system down, he noted.

Better engineering and system design and attention to the long-term need for maintenance can also reduce the mean time required to repair these mini and microcomputer systems, Schineller concluded.

Applications programming must provide the small business system user with an easy means of getting his equipment to do what he wants it to do, according to Roland H. Thomas, vice-president and marketing director for Data General.

Thomas would like to see an increased use of minicomputer Cobol because of its potential as an industry standard, the mobility of the programs written in that language and the familiarity users already have with it.

Small business system applications programs must offer operators — many of whom won't be DP people — an easy interface to the system. Multiple terminal control and data file support will also be required of most of these applications programs, Thomas said.

Large businesses are often computer sophisticates with an ability to solve many applications problems for themselves, but smaller business users often don't have the people required to write the applications programs specifically suited to their needs, he cautioned.

Headache Relievers

Mainframer-companies, turnkey outfits, consultants and software houses can save the nonprogrammer many headaches, Thomas told the NCC audience.

The Data General executive favors consultants and software houses over the other two sources of applications programs, however. With a reputation of becoming well acquainted with a small business's operation before attempting to do its programming, software houses and consultants have increased their revenues by 2,000% in the 1970s, Thomas said.

Mainframe vendors have to cover a sufficiently broad segment of their user marketplace with an application program to recover the research and development costs of writing it in the first place. As a result, their application packages tend to be generalized and may force the small business user to compromise his operation more than he wants to in order to fit the software, Thomas warned.

Turnkey companies tend to be specialists in applications programming. If the user and vendor are specialized in the same way — "great," Thomas said.

It's wonderful to take a suit that fits perfectly off a department store rack, but alterations are required more often than not, he added.

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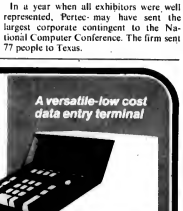

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Hopper Sees Minis and Micros as Today's Model Ts

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — Minicomputers and microcomputers are the Model Ts of the computer industry because they provide the potential for the interchangeable parts and standard tools and components needed to put computing into the public's hands, according to Capt. Grace Hopper of the U.S. Navy.

But the potential for standards and interchangeability in minis and micros is a long way from being realized, Hopper told attendees of the recent Computer Caravan here.

Henry Ford made the rare automobile a commonplace sight by making car parts standard and interchangeable with the introduction of his Model T. The computer and communications industry, too, needs to establish standards and methods for testing compliance with those standards, Hopper explained.

Users and the industry have tests for Cobol compilers and, more recently, for Fortran compilers, she noted.

Such standards and tests aren't necessarily for the benefit of the manufacturer. They really help the user, the Navy captain asserted.

"We will get standards only when users recognize the need for them and demand them," she added.

Rooting for I/O Standards

Hopper hopes the National Bureau of Standards (NBS) and the federal government will soon adopt the I/O channel interface, a national standard designed to permit the interconnection of peripheral equipment to mainframes made by different manufacturers.

The NBS is close to signing off on that standard, making its use mandatory in the government [CW, May 30]. Hopper said she was elated the Navy voted at the end of May to support the use of the I/O channel interface.

The Navy's concurrence with the standard provided a major basis on which the Department of Defense (DOD) could notify the NBS that this key user agency would go along with the standard, according to Wharton L. McGreer, senior systems analyst with the DOD Directorate for Automation Policy, Technology and Standards and the DOD representative to the American National Standards Institute's (Ansi) X3 Committee.

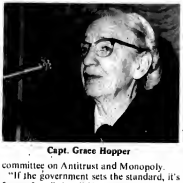
The DOD has qualified its concurrence with the NBS proposal in the standard's application and waver provisions in order "to adequately protect the growth of technology while still maximizing the benefits of economy and efficiency," McGreer said.

Adoption of the I/O channel interface is only the first chapter in the whole area of interface standards, he added. More of these standards will permit all sorts of vendors to plug into the industry.

Consumers will be able to buy systems by components the way they buy stereos now, McGreer predicted.

"Ansi may be slow," Hopper acknowledged, but standards are set if users really want them. The lack of standards in the communications and computer fields is the direct result of users leaving the whole area up to the federal government and to manufacturers, she said.

Hopper does not favor a proposal to establish a national standards board by the government — a proposal included in a Senate bill S.825 called "The Voluntary Standards and Accreditation Act of 1977," currently being studied by the Senate Sub-



Capt. Grace Hopper

committee on Antitrust and Monopoly.

"If the government sets the standard, it's frozen for all time," Hopper warned. If the standard is created through voluntary concensus, it is more flexible and adaptable to technological changes, she said.

Standards won't take away the artistry in programming and systems analysis from the DP technicians, Hopper stressed. "Architects build everything from New England saltboxes to California ranches, but they all use two-by-fours and light switches to do it," she said.

Hopper's belief in the standards potential of minis and micros stems from her own work with them and her previous work on large mainframes — "the dinosaurs."

The Navy captain has three of these "friendly beasts who are quite different from the dinosaurs because the minis and micros will talk to each other."

Hopper's ruggedized Data General Corp. Nova, her Digital Equipment Corp. PDP-11/40 and her Motorola microcomputer with 64K bytes of memory happily coexist in the same system, she added.

Hats Off to Hopper

WASHINGTON, D.C. — Pointing to her cap, Capt. Grace Hopper of the U.S. Navy described it as her "identifier."

Any identifier — including her hat — only says something to people if they recognize it, Hopper said.

She told attendees of a recent Computer Caravan here about three instances in which her black-and-white Navy captain's headgear had no meaning for the people she encountered.

Walking through an airport, Hopper was recently asked when the next flight was to depart for Houston.

Stepping off an elevator on which she had been riding with a couple, the captain overhead the wife ask her husband "what was that?" "A security guard," the husband replied as the elevator doors slid shut.

Headed for Toronto and a speaking engagement at a university, Hopper showed her passport to a Canadian Customs official and explained she was with the U.S. Navy. "You must be the oldest one they've got," the official exclaimed.

"Remember," Hopper said, "your data is only as good as its identifiers are familiar to the people who need or must use it."

With that, having identified herself, Hopper took off her hat.

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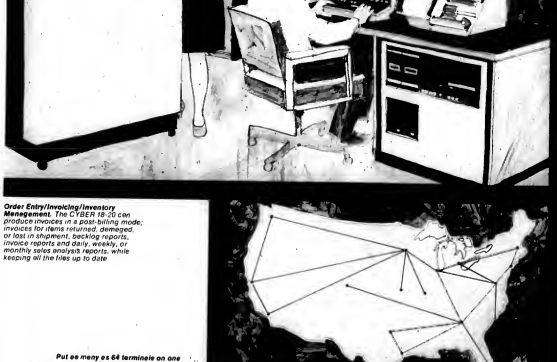

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Some States Have Already Begun

Nationwide Job-Matching Network Targeted for 1980

PHOENIX — A local newspaper editorial complained recently: "Something is wrong."

During February, its help-wanted pages listed more than 19,000 ads for jobs, while at the same time, unemployed in the county numbered 31,000. Twelve thousand of these people were collecting unemployment insurance benefits that averaged $71 a week.

At issue, according to the editorial, is the inaccuracy of unemployment statistics and the ease with which jobless can collect benefits without seeking employment.

Recently a program funded by the U.S. Department of Labor, but administered and operated by the states, was started to correct some inequities in the unemployment benefits process and put more Americans back to work. Under the program, state departments of economic security will use computers to match the jobless with job opportunities, speed up unemployment insurance and compensation fund processing and give better audits of fund accounts to those who pay: employers and other taxpayers.

The U.S. Department of Labor will spend some $187 million over the next four years to implement its Employment Security Automation Plan (Esap). Contracts for computers and software services will be awarded by individual state employment security agencies through competitive bids.

By 1980 a nationwide network of job matching and compensation fund accounting systems will be established. At least half the states will award contracts for equipment and other services in 1977 and 1978, and three are already in operation.

Colorado, Tennessee and Oklahoma state job placement agencies ordered and started installation of their systems the first of this year. Colorado, where the Department of Labor and Employment has a special emphasis on job matching, was the first to begin.

Computing power from dual Honeywell Model 66/60 large-scale computers, each with 384K words, will be distributed throughout the state via a network of 175 terminals located at job referral offices, according to Ray Pitsker, the department's DP director. In this lead-off Esap installation "the underlying strategy will be instilling confidence among employers and the unemployed that referral services work," he said.

Earlier attempts to computerize job availabilities in many states were slow, unwieldy and at the mercy of the DP requirements of other departments, he said.

"Complexities of federal welfare-related programs make job placement and unemployment benefit claim auditing very difficult to administer uniformly without assistance from a computer," Pitsker said. "It is further complicated by changes mandated by Congress and the Department of Labor."

All three of the participating states will have their procedures automatically updated or improved by Honeywell as changes are released by the federal government, Pitsker noted.

To handle regulatory or software changes, Honeywell established an Applications Development Center here which works with Department of Labor development centers in Washington, D.C., Kansas, Louisiana, New York and Nevada. The five federal centers are responsible for preparing selected programs for states participating in the Esap effort.

These changes, improvements and new software offerings are relayed to the states and Honeywell. Rather than putting each state through an individual update or conversion effort, Honeywell supports them all with immediate on-line and mailed versions of the changes and additions.

"This keeps our response time very high in delivering service to the unemployed and the employers," Pitsker said. "The staff we would have had to allocate to keeping our operations current is now free to work with compiling and maintaining job files."

He also noted that when Colorado develops procedural improvements "we can get them into the system for the other two states to use through Honeywell."

Oklahoma's installation will use dual Honeywell Model 66/20s with a total of 256K words which will service up to 150 terminals there. At Tennessee's Department of Employment Security, a single Honeywell Model 66/60 with 256K will be installed with up to 140 terminals.

"In Colorado, the first Esap applications were for job matching," Pitsker said. "Later this year those applications will be fully on-line, which means an employer or an out-of-work worker can walk into any of our 40 locations, provide information to one of our assistants and have it available throughout the system instantly."

Backup program support and systems maintenance are provided by Honeywell personnel located in the state capitals.

"Our intent is to help fill jobs first and provide increased benefit processing improvements second," Pitsker said.

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CONTROL DATA CORPORATION

Case Western Award Received by Amdahl

CLEVELAND — Computer designer Dr. Gene M. Amdahl has received Case Western Reserve University's Michelson/-Morley Award for 1977. Case Institute of Technology Provost Joseph E. Rowe announced the selection of Amdahl, who is founder and chairman of Amdahl Corp. of Sunnyvale, Calif.

The Michelson/Morley Award is presented to a scientist or engineer in recognition of outstanding achievements and significant contributions to the well-being of mankind. The award carries with it a $5,000 prize.

Four previous winners of the Michelson/-Morley Award have won the Nobel prize. The list of recipients includes the inventors of the transistor, the laser and the Polaroid camera.

Amdahl was instrumental in the development of the IBM System 360, which established new standards for peripheral equipment connections and computer family design.

Amdahl became an IBM Fellow in 1965, working on advanced computing systems. He left IBM in 1970.

Also Releases Guidelines

Adapso Urges Privacy Education for Lawmakers

By Molly Upton
Of the CW Staff

MONTVALE, N.J. — DPers should work to educate legislators and other policymakers about the computer industry and technology to avoid "impractical and unnecessarily restrictive legislation" in the privacy and security areas, according to a policy paper by the Association of Data Processing Service Organizations, Inc. (Adapso).

The group also released a list of security guidelines which it encouraged its members to adopt in order to further the protection of individual privacy.

As part of its efforts to promote understanding of the DP industry and its capabilities with regard to privacy and security, Adapso said it will:

- Seek opportunities to provide commissions, government bureaus and legislative committees with expert consulting support relative to the technical and business aspects of the DP industry.
- Develop and promulgate appropriate security guidelines for the DP industry that effectively apply available technology to security requirements.
- Support federal preemption over state privacy and security legislation:
- Encourage DP services firms, industry and the American public to voluntarily adopt measures designed to protect the privacy of the individual so legislative, administrative and other government action is unnecessary.
- Keep Adapso members informed on the issues, technology and methods regarding privacy and security.

In its policy paper, Adapso differentiated between privacy and security. Privacy is a social issue involving the question of what data should be collected, stored and disseminated, the association said.

Security involves the procedures to assure confidentiality, such as the protection of information from improper disclosure, modification or destruction, according to Adapso.

The organization "supports the general objectives of adequately protecting data on a private citizen from viewing, disclosure or uses which are not socially desirable," the position paper stated.

Security Guidelines

The security guidelines urged by Adapso fall into six categories of controls: management, organizational, operational, processing, documentation and customer.

Management as well as auditors and other personnel should participate in the development, design and implementation of controls and procedures to protect privacy and security of customer data, Adapso stated.

The section on organizational controls focuses on the need for a segregation of duties. For instance, systems design and programming should be separate from operations. There should be an independent data control group, as well as a computer file library, Adapso suggested.

Operational controls involve standardization of procedures for all operations and a review of these procedures. The association recommended a control function to ensure that processing of data is authorized and output properly distributed.

As part of standard procedures, manuals should be provided and an evaluation performed of the methods by which the computer controls its own operations. Procedures should be reviewed by the operations supervisor, the Adapso guideline stated.

Files should be labeled internally and externally and be controlled by a library. The operating system or programs should be used to the extent possible to check machine and file setup procedures, Adapso urged.

Steps to Prevent Fraud

To prevent or detect fraudulent manipulation of data during processing and to prevent misuse of data, Adapso recommended nine steps:

- Separation of the programming and operating functions.
- Restriction of the program knowledge of the operator.
- Effective supervision of computer operations.
- A planned program of rotation of operators.
- A joint operation where appropriate.
- Review of machine utilization logs and console printouts.
- Restricted access to the computer room.
- Use of a librarian to control issuance and storage of files.
- Bonding of key DP personnel.

The operational section of the position papers also advocated procedures to prevent accidental destruction of records and to ensure continuous operation.

The processing section deals with steps to ensure the completeness of data processed by the computer and the accuracy and authorization of that data. Rather than specific steps, the guidelines indicate general areas where control is necessary.

The documentation section stresses the necessity of having complete information available for all those involved in the DP process, ranging from customer to operator.

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Swedish Committee to Examine Problem of Data Vulnerability

By G. Russell Pipe
Special to Computerworld

STOCKHOLM, Sweden — The Swedish Cabinet has approved the appointment of a committee to investigate "the question of vulnerability of computerized systems and propose measures to reduce this condition."

This Cabinet-level attention to protecting computerized information in a national security context may represent a significant elevation of the security/privacy issue in Sweden and possibly in other countries as well.

The eight-member group, according to its directive, will consider computer security policy in its broadest sense. It is to look into problems of increased interdependence of various sectors of society because of the "increased use of computerized information systems, which are making society more vulnerable to disturbances, reduce resistence to violence, damage and other pressures."

Another aspect of concern is the concentration of computer facilities in the large cities, where 80% of the computer capacity is located, "their interrelated features and strong interaction with the private sector and the impact of a future public data network."

In terms of possible solutions, the committee will consider whether technical documentation on system architecture, design and operation should be supplied to the government for use in emergencies, if policies covering government access to private facilities are needed and whether organizations should maintain manual record systems to limit damage from operational disruption.

Minister of Defense Eric Kronmark took note of the need to assess how dependent Swedish organizations are on computer facilities and services located in other countries.

"The greater the flow of various kinds of data across national borders, the greater becomes the degree of dependence on stable political conditions both in the processing country and in those countries through which the information is transmitted," he said in a statement.

NCIC's Stolen Goods Data Base Found To Be Flawed After All

WASHINGTON, D.C. — The Federal Bureau of Investigation's National Crime Information Center (NCIC) seems to have acknowledged that its computerized stolen property data base may not be "error-free" after all, according to its May 1977 newsletter.

"An NCIC hit alone may not be probable cause to arrest," it warned participants.

The newsletter emphasized the warning by recounting an experience in which an automobile purchased from an insurance company was listed by NCIC as stolen. The automobile dealer, who had the title to the vehicle in his possession, learned this when he took the auto in for state inspection.

Since the dealer had the title to the vehicle, Missouri authorities "were suspicious of the hit," the newsletter said.

A response to a message sent to the agency that originated the record indicated the vehicle had been stolen and recovered sometime earlier and then had been turned over to an insurance company. The record was never corrected.

Since things like this happen, the NCIC newsletter warned its participating members that an NCIC hit furnishes the inquirer with only the fact of the stolen report. A hit confirmed with the agency which originated the record "is one fact that must be added to other facts in arriving at sufficient legal grounds for probable cause to arrest," it warned.

The newsletter further recommended that before making an arrest or seizure based on a stolen property record, an agency must contact the originating agency to confirm the hit.

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What Basic 4, DEC, Microdata, Data General, etc. should know about distributors.

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Editorials

Maximum Separation

While the Federal Communications Commission (FCC) may have been seeking to expand its influence in the DP area, the message it got from the replies to Computer Inquiry II [CW, June 13] was clear: Stay out of data processing.

Companies and associations that often have a hard time agreeing on the time of day were clearly united in this stance against the federal bureaucrats' move to extend their influence.

Hopefully, the FCC is listening. President Carter has made great political hay with promises to help trim the power and scope of the Washington bureaucracy. The FCC should heed those warnings.

The commission is in business to regulate communications and should stick to that. Beyond that point, it should allow open and free competition, which will result in lower prices to users and better services in the long run.

That Nagging Competition

It is not surprising to see the Bell System and its allies move into the states with some form of anti-competitive effort [CW, June 13].

The Consumer Communications Reform Act has been much less than an instant success in Congress. In fact, the immediate moratorium on competition that John deButts called for last September has been almost forgotten in Washington.

But the states are a different matter. Many state regulatory commissions are openly pro-Bell which, by definition, makes them against competition. Whether this type of telephone industry support will carry over into the state legislatures remains to be seen.

Only two states have actually introduced bills that would limit telephone company competitors. But four legislatures have passed resolutions that support the intent of the Reform Act, and these resolutions could be a prelude to formal legislation.

There are some who question how much AT&T could gain in the states since the courts have ruled that interconnection is a federal matter. But specific bills could set up business constraints to make it difficult for independent equipment suppliers to operate.

Significantly the two bills in Massachusetts and Minnesota were strongly backed by the telephone company unions. And threats of potential lost jobs for telephone workers may be enough to gather support from state legislators against competition.

Admittedly, the evidence supporting an all-out anti-competitive effort is still lacking. But it should not be dismissed out of hand.

In this regard, there were few "experts" that predicted AT&T would go before Congress for relief from its nagging competition.

Letters to the Editor

PRC Wants to Set Record Straight About OS/MVT and Privacy Test

The article entitled "OS/MVT Flunks Privacy Test Twice" [CW, May 30] has raised many comments. Since PRC Computer Center, Inc. was one of the companies mentioned, we wish to set the record straight.

As the "Computer Law and Tax Report" correctly stated, the Federal Energy Administration contract was awarded to Optimum Systems, Inc., which proposed an IBM 370/168 system operating under OS/MVT.

Our company was one of the protesters of that award. PRC submitted two proposals, one based upon the IBM 370/168 and the other based upon Burroughs Corp. B6700 equipment.

We correctly pointed out in our IBM proposal that OS/MVT did not meet the security requirements while MVS did and that we would install MVS as soon as it became a viable system. The proposals were submitted in the fall of 1974.

PRC also indicated in its Burroughs-based proposal that the Burroughs hardware/software system indeed met all of the requirements.

Among others, one of the bases for our protest was that the Burroughs system was 'more responsive to the requirements at a lower cost. The Comptroller General did rule that the Burroughs system did meet the security requirements and that the contract should not have been awarded to Optimum Systems.

However, as is usually the case, the protest process took so long (seven months), he ruled it would not be in the best interest of the government to reinitiate the procurement because of the investments in software and hardware made during that period.

James D. Tupac
President
PRC Computer Center, Inc.
McLean, Va.

Data Past

Five Years Ago
June 21, 1972

WASHINGTON, D.C. – Senate sources claimed the failure of criminal courts to take full advantage of computer technology was partly to blame for the breakdown of the criminal justic system and for the weakened "deterrent effect" of criminal laws.

– – –

MAYNARD, Mass. – Digital Equipment Corp. announced a programmable communications front-end processor for use with IBM 360/370 systems.

The DEC 11D23 was said to be the first front end to require no polling by the central system, relying instead on interrupt techniques used with conventional peripherals. The system was based on the PDP-11/20 minicomputer.

Eight Years Ago
June 25, 1969

MONTREAL – California Computer Products, Inc. announced an IBM-compatible, 30-msec access time disk drive for $18,500 which the firm said was "cheaper and twice as fast as the IBM 2311." Calcomp also introduced a buffered keypunch that it said could "increase productivity by 50%."

– – –

WASHINGTON, D.C. – Prof. J.C.R. Licklider of MIT stated in a report on the antiballistic missile (ABM) that the quality of software at the time was incapable of reliably supporting large, complex systems such as the ABM. He said such systems would be beyond the state of the art for at least a decade.

Licensing Called a 'Cop-Out'

Just what does a license to practice programming prove? Does it mean that because I have a license I will need fewer compiles and have less run time errors? Does it certify that my programs won't harm the public? Or, perhaps, does it mean I am morally superior to my unlicensed counterpart? I think not.

What, for instance, will the licensing authority base the qualifications for the programmer's license on? Knowledge of DP?

I suppose someone who works on an IBM 360/20 will need to know what a systems programmer on a Burroughs B6700 knows. Or perhaps a PL/I programmer will have to know Neat/3 or Cobol and BAL? Maybe an RPG-II programmer on a small system with no formal training will have to know double-precision arithmetic in Fortran?

All the people above may be excellent programmers at their level simply by knowing nothing more than their machine and their language, yet each one would also have access to data that would harm others.

I don't believe there is a test or a licensing board that can screen the public from incompetence or dishonesty. Naturally, it can revoke a license, but then only after the damage has been done.

A manager trying to select a programmer can do a far better job screening his candidates than any licensing authority. If done properly, the personal interview, testing and checking of job history can do more than any state board to keep incompetence and dishonesty out of our profession.

A license is a cop-out to doing a good job in hiring good people. In whatever field you choose to examine, dealing with a person with a license guarantees you absolutely nothing.

John D. MacLean
Monterey, Calif.

Language Plays Vital Role

Student's Background Significant Factor in DP Training

By Jack Stone
Special to Computerworld

Mansoor returned to America. My friend, a former student and captain in the Iranian National Police, spent nearly a week in Washington, D.C. several months ago, escorting a group of Iranian General Staff officers on a tour of American computer installations.

Their visit was part of a worldwide study of computer-based criminal justice information systems, in preparation for the implementation of such a system to support the requirements of the Iranian Police.

Aside from the delight of meeting and socializing with Mansoor again, I couldn't be more proud of his selection to accompany the senior officers on this trip.

He was one of 16 police officers who participated in a nine-month training program provided in Washington during 1975-76; my involvement was that of the senior instructor for the computer technology portion of the program.

It was quite an exciting experience to observe the development of these officers and participate in the process of bringing modern American computing technology to members of a newly emerging industrial society.

Overwhelming Challenge

In this column, and others that will appear in the future, I want to reflect on this rather overwhelming training challenge:

- Training students for whom English is a second and remote language in advanced DP systems at an American setting staffed by English-speaking instructors.
- Designing training programs that are truly effective and then finding ways to keep costs in line.
- Coontering the psychological and sociological problems of learning in this situation.
- Drawing inferences which can help improve current learning styles and strategies in American computer centers.

Program Structure

Let me first briefly describe the structure of the 1975-76 program. Of the 16 officers, six were members of a computer center systems and programming staff (an NCR Century was installed) and 10 were users. The users were not technically trained in DP, but had a good understanding of applying DP to the needs of their own bureaus in the police department.

All instruction was in English; none of the instructors spoke Persian or had other than a cursory knowledge of Iranian culture. All of the student officers had extensive formal training in English, but their English-language fluency was still well below that required for effective DP training when they arrived.

As a result, the first two months involved an intensive English-language course, rebuilding and expanding practical English-language competencies.

The next two months were devoted to programming fondamentals, third/fourth-generation hardware and software, terminal-oriented systems and elements of ANS Cobol. At this point, nine of the users had completed their assignment and returned home.

During the next four months, half of each instructional day was given to computer subjects, including advanced Cobol programming techniques, operating systems and job control language, time-sharing systems and basic systems analysis and design.

The other half of each day was devoted to police science and criminal justice information systems, presented by the Planning Research Corp. (PRC) Public Management Services Division.

This period also included two full weeks given to minicomputer systems and programming.

The remainder of the schedule was occupied with advanced police information systems training, including "on-the-job" training at field locations of PRC where significant police systems development projects were taking place.

The Human Connection

By way of commentary, let me begin by expanding on the importance of this project. First, sharing this fascinating and enlivening Iranian culture is an absolute "must."

I gained considerable insight into Iranian life since the officers imported and organized a minicosm of downtown Tehran in Washington. They brought their exotic and enchanting music, food, dance, art, handicraft and literature.

But more importantly, they thrilled me with their exuberance toward life, adoration of their family, devotion to duty and love of country.

Second, I believe it is valuable for the industry at large to have an appreciation of the challenges and problems associated with building competent technical and managerial staffs within the computer centers of enterprises based in emerging nations — staffs who desire talents to jump quickly into fourth-generation computing systems.

Knowing the difficulties that American computer centers have in acquiring the proper personnel, we all should have a pretty fair idea of how demanding personnel staffing is in the Middle Eastern nations.

Third, my experience in training Iranian computer people prompts this message to American DP trainers. For a long time, I have been preaching the gospel of planned, organized training programs designed to meet the specific needs of a particular center.

They should be oriented and structured to accommodate the broad diversity of backgrounds and experience of American center personnel and humanized to assure that a qualified instructor pays special attention to the unique problems of each individual.

Only Acceptable Approach

There is no other acceptable approach when facing students who are, in effect, learning practical English concurrently with advanced computer technology.

The conscientious DP instructor teaching students for whom English is a second language quickly learns the importance of and responds to all of those factors that affect learning — culture, attitude, language, motivation, experience — if he or she was not sensitive to them before. (Such an experience is a dynamic demonstration of how little attention is paid to these same factors in American computer centers).

A final note. Later in the day Mansour arrived in Washington, an airplane carrying 10 Iranian men and women landed at the National Airport. Mansour and I escorted them to their hotel.

The nine-month instructional program for the 1977 class of Iranian police officers in practical English, modern computing systems and police information systems began the next day.

Readers who wish to share their experiences in the DP training of foreign nationals are invited to write to Stone, Suite 222, 2233 Wisconsin Ave. N.W., Washington, D.C. 20007. All correspondence will be acknowledged.

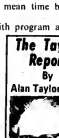
Minimizes Error Impact

Plessey 250 Design Yields Reliability Plus Security

The Plessey Telecommunications System 250 capability machine is mainly known as a system with incredible reliability. The specifications around which it was designed called for a 40-year mean time between failure (MTBF).

It was not built with program and file security directly in mind, but what happened suggests the security may well be a by-product of obtaining our computer reliability in a new and nontraditional manner.

The Taylor Report
By Alan Taylor, CDP



Traditionally, our computer reliability has followed the concepts laid down before the time the first commercial machines were being developed. In 1952, for instance, Univac I gave security by providing for two separate identical processors and a comparator. Instruction execution was halted if the two processors did not come up with the same answer.

Other systems took approximately the same approach, although later it was often watered down and only a few spot checks were maintained. This happened because more interruptions were being caused by faulty comparisons than by failures in the processing units themselves.

There were a number of advantages to this traditional approach. The amount of logic design was kept to a minimum because the design of the original processor could simply be copied for the second one. The comparator unit was really the only design cost.

In addition, the usage of computer systems at that time fit into the system. Basically, computer output was being very closely checked by the "programmers" (as they were soon to be called).

Programmers were not yet fully professionalized in a narrow specialty. Instead they were the users and researchers themselves. They checked to make sure the multiplication algorithm had worked.

Application and file security, as we know it, was only thought of on military operations and was then handled by need-to-know controls.

The double-calculate-and-compare method fit all the early 50s era situations, but later, increased reliability created pressure to drop most of the comparisons and to rely upon high-quality logic, components and maintenance.

These reduced the frequency of reliability failures to a tolerable level — or at least to one that has been tolerated.

What this approach has not done is reduce the impact of an error should it occur. And that is where the System 250's 40-year MTBF requirement forced Plessey to adopt a new style of architecture — one that would contain and minimize any errors that did occur.

New-Style Architecture

In this new architecture, conceptually there are two virtual machines. One of these is a processor; the other monitors the operations of the processor right in the nsec time range.

From the designer's point of view, this process-reviewer machine was aimed at noting and taking action on when, where and how any potential error occurred.

The failure could be totally neutralized and prevented from becoming a system failure at the application level.

Therein lies the way the fabulous MTBF figures were obtained.

Naturally, this means the reviewer machine must have input about what constitutes allowable results for various operations. It must also have lots of power to stop, for instance, the destruction of data as a result of storing computation results in an erroneous address over data that is essential.

In brief, what the reviewing machine can never permit — if it is to avoid a system fault — is any of that "results will be unforeseatable" nonsense that has become an accepted part of the situation in today's computer systems.

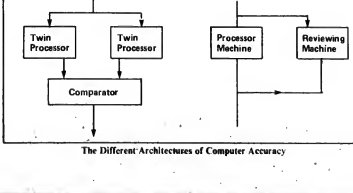
This monitoring of what is happening in the processor and the ability to control it before it goes beyond bounds are exactly what the present-day need for computer, application security wants.

Normally, it can be only poorly simulated in the software, instead of having the information for the reviewing machine built into the hardware.

And, naturally, there is still a price to be paid. The cost of a second, different logical design for a reviewing machine is added to the logical design costs of the actual processor.

But that is a price that covers two areas — protection from system failure and security of application programs.

For either one the cost might well be too high, but for both it can be a bargain.



The Different Architectures of Computer Accuracy

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The Great Code-Off — Part 1

Should Shop Resemble Assembly Line? Or Craft Guild?

The Sociology of Computing

By Miles Benson
Special to Computerworld

The corporate headquarters of Alchemy Chemical and Soffii Paper are no more than a mile apart on the Straightarrow Turnpike in Open Spaces, Massachusetts.

But their computing shops might as well be on Mars and Mercury. They are light-years apart in organizational philosophy. And the extremes in which they find themselves are characteristic of the dilemmas of modern computing.

Over at Alchemy, Stan Sorcerer runs a tight ship. His employees have a dress code, fixed working hours, specified coffee breaks and a strict behavior program.

The standards defined for his programmers are profuse and rigid. Both documentation and listings are subject to periodic inspection and surprise review. Fortran and Cobol are required languages for all applications, and precompilers are used to both encourage and enforce structurd programming standards.

Management of tasks is by schedule, and if a programmer gets behind in his work he is expected to put in voluntary overtime to make it up.

The atmosphere in Alchemy is tense, businesslike and productive. Stan is fond of quoting data which shows his programmers produce three times the national average.

From all outside appearances, Stan Sorcerer has built himself a software factory, and he runs his shop like an assembly line.

A Different Perspective

But at Soffii Paper, Herb Bond sees things differently. Herb's programmers' dress could best be described as neo-hippy. They come and go through the swinging doors of Soffii at all hours of the day or night.

The standards manual would fit within the index of that used at Alchemy, and it uses words like "can", and occasionally "should" instead of "shall" and "will." Herb uses peer code reviews, but never conducts management code inspections.

Fortran and Cobol are the predominant languages, but one of his ace programmers is coding a report generator program in Pascal now, and loving it.

Management of tasks is by progress reporting, with emphasis on product quality rather than schedule.

The atmosphere at Soffii is laid back, unbusinesslike. It resembles a graduate school seminar. Herb never quotes statistics about programmer productivity, but he has been heard to say that he doesn't believe anyone who does — he's seen how they got their numbers.

From all outside appearances, Herb Bond is herding a group of untamed software craftsmen in the general direction of product completion.

Now it is patently obvious that Stan Sorcerer and Herb Bond can't both be right about how to run a computing shop. Either programmers should function like an assembly line or as craftsmen, right? But which?

Well, the question just isn't that easy to answer. Ten years ago, the assembly-line philosophy appeared to be the only way to go. Software was characteristically overly complex, too expensive and behind schedule. Software modules were handfabricated and fitted together by craftsmen. It seemed obvious that software's characteristic problems were caused by its craftsman approach.

Acting on that presumption, management poured a great deal of money into finding ways of assembly-lining software construction. Cobol was the first hope — an English language by means of which you talked to computers. Managers could read it, and grocery clerks could code it.

It didn't work out that way, though. No matter how you sliced it, a program was still a program. It had a level of nitty-gritty detail that managers simply didn't care to read and grocery clerks couldn't fathom. And Cobol didn't change that.

But management kept trying. Techniques which promised standardization were encouraged. Individuality was played down and teamwork stressed.

The term "ego-less programming" was invented. Configuration control and quality assurance were formalized.

And when structured programming came along promising miracles, management bought it with alacrity. The promised land of assembly-line programing seemed on the horizon at last.

Giant Irony

But there was a giant irony in this quest for the ultimate automation. While researchers poured their energy into assembly-line techniques, hardly anyone was paying attention to the technologist's state of the art.

In spite of all the assembly-line action, it was still craftsmen who were producing software. And no one was developing and promoting better tools for those craftsmen.

Oh, actually, that's not quite true. There were technologists whose efforts were directed toward creating better tools. But hardly anyone cared. If a new technique didn't promise a dramatic shift toward the assembly line, few managers cared to look further into it.

And without management support, new tools never made it into the production programmer's hands.

Let me make one thing perfectly clear. I don't mean to be saying that assembly-line programming won't happen; some day. The Henry Ford of software may be designing the ultimate fabrication method somewhere right now.

But while researchers and funders continue that search, someone needs to be concentrating on the nearer term needs. It is foolish to move the field impetuously into an assembly-line posture when no one knows how to design an assembly line. And it is foolish to suspend tool development and usage because someday we won't need them any more.

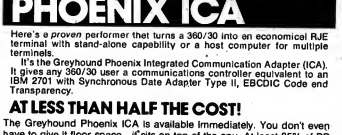
That's enough of a soapbox presentation, though. Perhaps I digress too far from the world of Straightarrow Turnpike, and Stan Sorcerer, and Herb Bond.

Or perhaps I don't. Stan Sorcerer's shop is the culmination of today's state of the art in assembly-line techniques. And Herb Bond's shop is the culmination of the craftsmen-at-work approach.

And that soapbox oratory was an attempt to explain why no one can really say that Stan and his productivity figures are right and Herb is wrong. Or vice versa.

Next week: The attempt to resolve this philosophical question ends up in an intellectual tavern brawl.

HIGH COSTS KEEPING YOU OUT OF TELEPROCESSING?



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Letter to the Editor

Search Goes on for Sources Of Careers for Handicapped

I would like to take this opportunity to offer a few comments on the article entitled "DP Industry for Attitude on Handicapped" [CW, April 4].

As the article indicated, IBM has been a leader in hiring handicapped people in the DP area. IBM has also hired, on a cooperative basis, several deaf students from both Gallaudet College in Washington, D.C., and the National Technical Institute for the Deaf (NTID) located in Rochester, N.Y. NTID is the only technical college for the deaf in the world.

As part of the Rochester Institute of Technology (RIT), NTID has been training young deaf people from across the country in a variety of programs, including both associates degree-level DP majors and baccalaureate-level computer science and technology majors.

It should be noted that, in addition to IBM, NTID graduates in these fields have also been hired by such firms as Anheuser Busch, Xerox, Mixing Equipment Co., Glidden-Durkee, and the National Aeronautics and Space Administration Goddard Space Center.

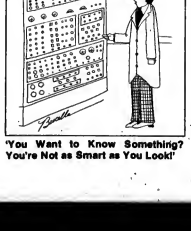
Some of these organizations, particularly U.S. Steel and others such as Xerox, Prudential, Mobil Chemical and 3M, have also provided our students with excellent hands-on work experience (co-op) blocks during their educational programs.

I don't intend to imply we have an overabundance of opportunity in the DP field for our students and graduates. On the contrary, it takes a lot of hard work and persuasion on our part to place a student with a firm.

However, we do appreciate the willingness of an employer to give deaf programmers and operators that first opportunity and endeavor to recognize them for their efforts.

As our student population nears 1,000, we will need to continue looking for new sources of career opportunity for our graduates with progressive firms like the ones I have already mentioned. All such companies share a common need for trained, qualified employees — some of whom may happen to be deaf.

Rich Giandana
Coordinator, Employment Development
National Technical Institute for the Deaf
Rochester, N.Y.



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Government Enforcement Undesirable

DP Licensing Could Establish Dangerous Precedents

By L.D. Rizio
Special to Computerworld

The more I read about the licensing of DP professionals, the more apprehensive I become. While I have many apprehensions, I feel there are two dangerous precedents which licensing may establish. These are: (1) an implication of knowledge we do not possess and (2) that we may be encouraging the very actions we are attempting to avoid.

My first apprehension concerns the fact that we are called upon in our profession to design and program systems for the total gamut of business applications. We are not knowledgeable enough to be able to detect all fraudulent activities, improper procedures or poor system designs.

In most cases, our knowledge of these applications is totally dependent upon the knowledge level of the users that have dictated the need for the system.

To believe that a systems analyst or programmer can guard against all fraudulent activities or be exposed to losing his license is unfair and unnecessary.

While this is a danger, there remains an even more serious consideration.

Community Furor

The furor concerning licensing has, in large part, been raised by our own community. While licensing is proposed as a voluntary activity, are we perhaps establishing the precedent to state and federal governments that we believe, in fact, we should be licensed?

These governments may assume that we, as DP professionals, encourage licensing. Many in our profession may voluntarily decide against licensing for their own personal reasons, reasons not related to fraud or incompetence.

Should there be many professionals who are not licensed, what assurance have we that state and federal government will not decide for themselves that the precedent has been established by us and that they should pass laws which force us to become licensed?

Reader Commentary

Most professional societies to which we compare ourselves have licensed themselves voluntarily and without the interest from government circles now surrounding our profession.

I am concerned that we are establishing the precedent with which to encourage government-controlled licensing. No other profession has done this.

While I see benefits to encouraging our professionals to become more knowledgeable and to perform proper research, I question the validity of licensing as the most effective means of doing this. This is a sensitive and hotly contested issue.

I suggest only that adherents to either side of this question (and there appear to be no objective personnel left) give total and complete concentration to all of the implications of any action that we recommend.

Because this issue is so hotly contested, I feel it behooves all of us to ensure that we have given it all of our complete and undivided attention to guarantee we get what we really want.

Rizio is director of management information systems at Avery International in San Marino, Calif.

Your CDP Designation May Become Outdated Unless You Speak Up

By Kenniston W. Lord Jr.
Special to Computerworld

How would you like to become a "CCP"?

What's a CCP, you say? Well, that's one of the designations under consideration by the Institute for Certification of Computer Professionals (ICCP) for changing the Certificate in Data Processing (CDP) designation. Under its current thinking, the CCP would "grandfather" you to the new designation, such that the CDP would now be lower in prestige and rank than other certificates, now that the ICCP has decided to begin testing several specialties.

It's the slot on the ladder to which they will relegate you after you have already met the qualification criteria and passed the examination.

In other words, it would seem that the

. . . And in This Corner

idea of the CDP as *the* certificate to have has now been diminished – now that you have yours.

I don't know how you feel about such action. My feeling is this: I worked for years to meet the qualification criteria, even obtaining the degree when they required one.

I paid my fees to the Data Processing Management Association (DPMA), took the test and was awarded the certificate. Thus, I feel there existed a contract between DPMA and myself as to the value of the certificate, a contract assumed by ICCP.

For the ICCP to arbitrarily change my designation without my approval is, to my mind, a violation of that contract.

What do you feel? Is it important to you that the CDP designation remain the capstone designation, with other certifications being subordinate?

Would you be willing to join (and assist in funding) a class-action suit to force ICCP to leave it alone or else change it only upon the approval of a majority of the holders of the certificate?

Write to me, in care of *Computerworld*. This is an issue upon which you should express your opinion immediately.

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Letters to the Editor

Thanks Go to DPMA

Congratulations to the 30,000 Boy Scouts of America who have earned the Computer Merit Badge ["Boy Scouts" DP Savvy Growing," CW, May 2].

Surely a word of thanks is due to the Data Processing Management Association (DPMA) and the men and women of that organization who cooperated with the Boy Scouts in the initiation and development of the program.

My information is that the program was established in 1968 after four years of personal effort by Geoffrey H. Botton, past president and international director of the Los Angeles Chapter. Botton became interested in scouting when one of his sons became an Eagle Scout.

In the pursuit of the required number of merit badges to achieve this rank, the son asked his father why there wasn't one available in DP. Botton developed the requirements needed to achieve the badge and served as the first counselor.

Many DPMA chapters today participate in the DPMA computers merit badge program. Individual members serve as counselors to the local districts, assisting boys in various troops in the district.

In addition, some chapters conduct a long counseling program which included seminar sessions and a visit to a DP installation.

DPMA's efforts to foster a better understanding of the vital role of DP among today's youth are not limited to the scouting movement.

The student organization program, which has been in operation for a number of years, was expanded in 1976 into a two-level concept strictly from student chapters for college and university students interested in information processing.

D.F. Jervis
Hamilton, Ontario

IFA First Used in '74

I immensely enjoyed the series on Information Flow Analysis (IFA) by Robert B. Chamberlain ["Plenty of Work Seen Needed Before DBMS Selection," CW, May 23; "Early Study May Show User Won't Need Full DBMS," CW, May 30].

In all fairness, however, to give credit for this methodology where it is due, IFA was developed by Performance Development Corp. and used first in 1974 for U.S. Pipe and Foundry, one of its existing clients.

It has remained one of the staples of our consulting activities ever since.

It was a pleasure to see that this technique has caught the interest of Chamberlain, a former Performance Development employee, and that he is bringing this valuable tool to the public's attention.

Karen Guth
Vice-president of Administration
Performance Development Corp.
Princeton, N.J.

Computerworld welcomes comments from its readers. Preference will be given to letters of 150 words or less. Letters should be addressed to: Editor, Computerworld, 797 Washington St., Newton, Mass. 02160.

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Reader Responses Recognize

Surveys, Awards Have Some Value Despite Flaws

By Don Leavitt
Of the CW Staff

In "New Ideas Sought to Bring Order to Package Surveys" [CW, Apr 4], I expressed some concerns I had about the value to the user of such efforts as Datapro's Honor Roll of Software Packages and International Computer Program, Inc.'s ICP Million Dollar Award Ceremony.

A number of people took up my invitation to share their thoughts on the subject and the makeup of the respondents confirms my original concern perhaps better than whatever their letters and phone calls added to the discussion.

With one exception, all the responses came from vendors or from people who had a proprietary interest in the software industry.

On the face of it, this suggests users have become shrewd enough — perhaps, just busy enough — doing their own evaluations so they don't really care about the accuracy or even the existence of mass survey results.

Vendors, on the other hand, are extremely interested in seeing the statistics developed by such efforts.

Objectively, the results provide the vendors with indications of how well their products stack up against the competition and perhaps the amount of work they better put into support to improve the ratings next time around.

Subjectively, the vendors that have products on either the Honor Roll or the Million Dollar Club or both are delighted to highlight the fact in their advertising.

My biggest complaint about Datapro's Honor Roll was the minimal number of user ratings — six — needed to get a package on the list assuming the ratings themselves were good enough.

A number of vendors have admitted they urge their users to respond to Datapro's annual questionnaire and the urging is often done in such a way that the user thinks favorably about the product while doing the rating.

With that in mind, it seems almost ironic that the one user who wrote in suggested that the way to increase the number of responses Datapro receives is to have the vendors cooperate with the research organization "by urging their users... to complete the questionnaire."

He also suggested printing the rating forms in publications such as *Computerworld*, inviting readers to complete and return them to Datapro.

While this might indeed increase the number of ratings received, it would do nothing to solve another basic problem with the Datapro survey. There would be no control over who or how many responded from any given organization.

Dennis Hamilton, a staff writer at ICP, reported an approach some people at his company have considered to overcome that problem: a three-way survey form in which respondents would be identified as technicians, users or management.

That would certainly bring into focus the different concerns individuals in these positions have about any software, but Hamilton admitted the major stumbling block in this proposed approach is the development of good, substantial questions that are unambiguous and an answering scheme that is similarly clearcut.

That same high level of preparation occurred to us here at CW when I suggested we might be able to conduct a good, definitive survey working closely with a cross-country sampling of users on one of the data files we have at our disposal.

And when I suggested that working by phone would allow our interviewers to make sure they understood the users' answers, the proposed project quickly went down after a realization of the cost.

Various writers suggested the need for an independent organization to audit the vendor claims (when they made them) of how many users they actually had. But again, no user made any comparable suggestion. So it appears the "numbers game," when it is played by the vendors, is recognized by the users as essentially meaningless.

All of this seems to lead to the conclusion that the current surveys and award dinners are useful, but only as general indicators of what products are available and how well they are being received in general.

However, when it comes right down to the time for a choice, survey results are no guarantee of how well a product will work in a given situation.

Datapro appears to be right on target when it said, in one of its reports: "Preparing and running benchmark tests on your computer system is by far the most convincing way to assure the selection of a suitable software package."

TAC Disk Utilities Geared to DG CPUs

ATLANTA — A pair of utility packages from Technical Analysis Corp. (TAC) was designed to ease the use of disk subsystems on Data General Corp. CPUs, according to a TAC spokesman.

The DG Disk Copy Utility (FCopy) provides "very fast and easy" disk-to-disk, disk-to-tape and tape-to-disk copying in disk image, the spokesman noted. It runs independently of an operating system.

The DG Fast Tape Dump-and-Load (FDump/FLoad) routine provides fast backup to and from 9-track magnetic tape. It also allows selective copying of files, programs and directories.

FCopy works with DG's 2.5M-, 10M- and 25M-byte disk drives. FDump/FLoad works with those same units and with 92M-, 96M- and 192M-byte disk drives as well.

FCopy can be used on any of the DG CPUs with 32K words of main memory. FDump/FLoad runs under any version of DG's Rdos on Novas or Eclipses, the spokesman said.

Each of the packages is available under a one-time license fee of $500, TAC said from 120 W. Wieuca Road N.E., Atlanta, Ga. 30342.

On-Line Business Applications Available for Use Under CICS

NEW YORK — Users working with IBM's CICS can get order entry and billing and accounts receivable applications up and running very quickly with the help of software from On-Line Commercial Systems Corp., according to a spokesman.

The on-line order-entry, billing and inventory system is said to include logic to log an order onto the system, to make it available for maintenance purposes before it is filled and to bill it with various options.

These include facilities to handle partial shipments, back orders and cancellations, the spokesman said.

Filled orders are retained by the system for a user-specified period for inquiry purposes.

The On-Line Accounts Receivable System includes on-line posting of cash, invoices, returns, credits and journal entries, the spokesman continued. On-line batch balancing, unlimited dating, automatic discount application and the ability to split checks over various accounts are also built into the system, he said.

The totals on individual invoices can be split over various general ledger categories and accounting periods, he noted.

Rather general on-line inquiry functions are also supported, and the receivables system is updated on-line at billing time "as is the inventory system," he added.

Written in Cobol, the applications package runs in VS partitions ranging from 400K to 1.2M bytes and costs $42,000.

In addition to being packaged for a user's in-house implementation, the facilities are also available through the vendor's on-line service bureau operation, based on an IBM 370/158.

Commercial On-Line Systems, Inc. is at 355 Lexington Ave., New York, N.Y. 10017.

Dearborn Now Markets 'Visam'

SCHILLER PARK, Ill.— The Variable-Length Indexed Sequential Access Method (Visam) is now being marketed by Dearborn Computer Leasing Co., under terms of an agreement with Visam's developer, the Weiland Computer Group.

Visam was described by Weiland as a direct replacement of IBM's Isam or Vsam (Real) software and a true variable length access method that observes all standard IBM Isam conventions while offering improved throughput and more efficient utilization of disk storage.

The software, initially available in 1970, has been enhanced several times since.

Visam can be acquired as a stand-alone product for a one-time cost of $6,360 or leased in conjunction with Dearborn's DOS/RS [CW, June 6] for from $275/mo for 12 months to $125/mo for 36 months.

Those lease prices are in addition to the costs of DOS/RS itself, the spokesman noted from 4849 N. Scott St., Suite 401, Schiller Park, Ill. 60176.

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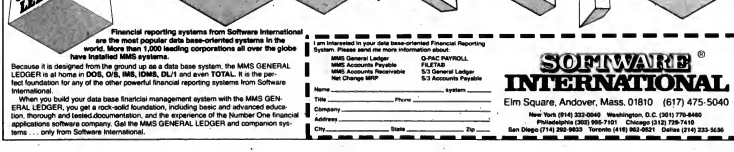

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N.Y., Washington Meetings to Focus on Productivity

Users in the northeastern U.S. can attend a different conference on computer measurement and related topics each week for the next three weeks. Two of the meetings will be in the Washington, D.C. area; the first one, however, will be in New York.

The Northeast Computer Measurement Group has scheduled an all-day meeting at Tisch Hall, New York University, this coming Thursday, June 23. Tisch Hall is at 40 W. 4th St. in Manhattan.

Further information about this meeting — which is free — is available from Anne Cogswell, of BGS Systems, Inc. in Waltham, Mass. (mail address: Box 128, Lincoln, Mass. 01773).

A national conference on computer system productivity will be held in Washington, D.C. on June 27-29, sponsored by the Capital Area Chapter of the Society for Management Information Systems (SMIS) and *Government Executive* magazine.

Sessions have been scheduled to cover trends in technology and software, performance measurement, management practices and planning and budgeting.

The registration fee is $265 for SMIS members and $295 for nonmembers.

The conference is being run by the Institute for Professional Education, Suite 601, 1901 N. Ft. Myer Drive, Arlington, Va. 22209.

Technical Aspects of Systems

Dr. David Freeman of Ketron, Inc. and Dr. Carl Palmer of the U.S. General Accounting Office will be the guest speakers at an all-day conference sponsored by the National Capital Area Computer Measurement Group on July 6.

Afternoon sessions at the meeting will focus on technical aspects of many of the newer hardware systems. A panel will discuss problems of conversion to IBM's MVS environment. An invited paper on "Computing in the 1980s" will also be part of the program.

This meeting will be held at the Ramada Inn in Tyson's Corner, Va. Registration ($15/person) is open to anyone interested and gets underway at 8:15 a.m.

More information is available from publicity chairman Robert P. Garrett, HQDA, DAPC-PSB-P, 200 Stovall St., Alexandria, Va. 22332.

Package Summarizes SMF Data

KANSAS CITY, Mo. — The SMF-TYPE5 package from Joseph M. Joyce & Associates accumulates execution time and CPU time for all jobs in a user's SMF history file using the Type 5 SMF records generated in IBM OS/VS1 or VS2 environments.

The software also lists the number of times each job name has run, number of cards read, total execution time and total CPU time in hours, minutes and seconds. The package also lists summary totals by job name and file totals, a spokesman noted.

The $100 package will be shipped 24 hours after receipt of a signed agreement and the DCB of the SMF record, Joyce added from 5925 Rockhill Road, Kansas City, Mo. 64110.

Booklet Highlights Results of IPT Use

CHICAGO — Some of the disciplined approaches to program development — often labeled Improved Programming Techniques (IPT) and encompassing structured programming, programming teams, support libraries and structured walk-throughs — can be used to maintain existing systems, according to a report just published here.

"Improved Maintenance Techniques" was based on research, experience and interviews with professionals who have used the techniques with "excellent results," the publisher said.

The 20-page booklet also includes capsule descriptions of selected software packages to aid maintenance, he noted.

The report is available for $6/copy from Shetal Enterprises, Dept. CWPR, 1787 B West Touhy, Chicago, Ill. 60626.

Cobol Program Aids COM Tape Creation

NEWPORT BEACH, Calif. — The BHCOM software package now available from Bell & Howell (B&H) reportedly provides users of the company's 3700 standalone computer output microfilm (COM) recorder with an input tape that is completely formatted in one pass of the user's host computer, according to a spokesman.

Written in ANS Cobol, the package can be used on any CPU that supports a standard compiler. Software previously available from B&H was coded in Assembler, limiting its applicability to IBM 360/370 CPUs, according to a spokesman.

The formatting provided by the B&H software includes the insertion of title lines and indexing references and coding for a choice of positive or negative appearance of the data to be microfilmed. As many as 20 formats are possible with each title frame and index entries can be 42 characters long, the spokesman noted.

BHCOM runs in a partition of about 30K and is provided free to any user of the 3700 COM recorder, B&H said from COM-Products Division headquarters, 1451, Quail St., Newport Beach, Calif. 92660.

DP Digest Publishes Report On 'Structured Programming'

LOS ANGELES — "Structured Programming," recently published by Data Processing Digest, Inc. (DPD), is a 28-page booklet including all the DPD articles and book reviews on the subject from December 1973 through March of this year.

Also included, and supported by a subject index, is a bibliography of other references to structured programming contained in professional journals and conference proceedings. Names and addresses of the publishers of these original items are detailed, according to a spokeswoman.

The current report is an update of one the company published some time ago, she said.

The "Structured Programming" report costs $15/copy and can be ordered from DPD, 6820 La Tijera Blvd., Los Angeles, Calif. 90045.

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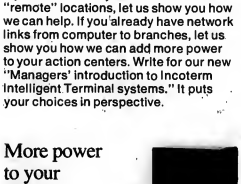

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If you missed seeing our new STC 8350 at its New York introduction—or the operating unit we displayed in the Computer Caravan—stop by and see us at the NCC Show, Booth 2020. You can also see our new STC 1900—a high density tape drive for minicomputers. Plus our complete line of high density disk and tape subsystems.

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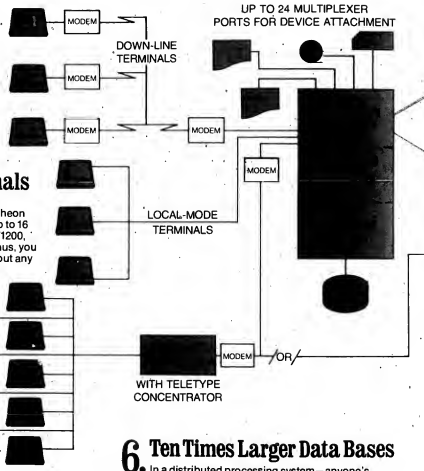
Here are ten good ones. Watch this space in coming months for at least five more.



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A brand new capability of our PTS/1200 system that lets you assign the task of multi-drop terminal control, and even applications processing, to a Raytheon system, rather than to your mainframe. Of course, the PTS/1200 can communicate in either batch or interactive modes—or both concurrently—to your mainframe as needed. You can't get this from IBM.

2. Local-Mode Terminals

A long-standing capability of the PTS/1200, and one that only Raytheon offers. It means you can attach up to 16 terminals in local mode to a PTS/1200, at distances up to a mile away. Thus, you get a network in local mode without any TP requirements.

3. Teletype Concentration

Announced two months ago, after more than a year of user operation, this unique feature lets you add teleprinters to the same transmission lines as your 3270-type terminals, with maximum performance and data rates preserved. Know anyone else with this $80 a month feature?

4. Immediate Deliveries

Raytheon has always been known for prompt delivery. We know that when you need it, you want it. There are five new capabilities described in this ad. All five will be in production by June 30th. This year—1977.

5. Lowest Prices

A major attraction of Raytheon alternatives to 3270/3790 has been pricing. Even with IBM's recent price reductions, our pricing schedules permit you to obtain far more capabilities than IBM offers—at rental or purchase rates that are up to 27 per cent below IBM.

6. Ten Times Larger Data Bases

In a distributed processing system—anyone's distributed processing system—you need disk storage capacity adequate to handle the workloads. Today, Raytheon is announcing a new 320-megabyte disk capacity for its PTS/1200 system. That's 10 times larger than the 3790's.

od reasons to choose Raytheon.
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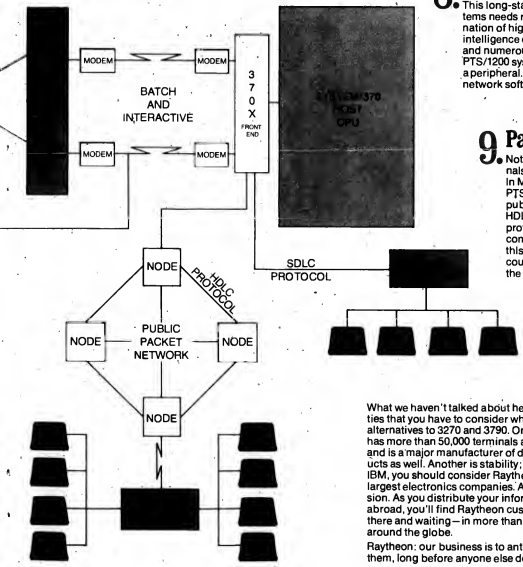
7. Simultaneous Interactive and Batch Communications

Two months ago, Raytheon demonstrated what no one else has—true 3270 concurrency. Our 3270 emulator lets you communicate interactively on a transaction basis with your host CPU. Our 2780/3780/HASP emulator package lets you—at the same time—communicate in batch mode. What counts about that is immediacy: you can do both right now, without any additional applications or front-end software development. And especially, no VTAM or NCP hassles.



8. Total Programming Freedom

This long-standing feature of Raytheon systems needs repeating. Because of the combination of high-level language, very large intelligence capacity, powerful macro routines, and numerous emulators, PTS-100 and PTS/1200 systems treat your host CPU like a peripheral. The result: data networks without network software development.

9. Packet Network Connection

Not with TTYs or ASCII-based terminals, but with 3270-type CRT devices. In March, Raytheon demonstrated its PTS-100 terminals operating on a U.S. public packet network under both HDLC line protocol and X.25 device protocol. We are the only major U.S. company operating such terminals on this international standard in other countries. Now we have it for you in the U.S.

10. SDLC Operation

And yes, every system in the PTS-100 family operates under SDLC protocol if you want it to. Or binary synchronous. Or HDLC. Or 1006. Or 2848/2260. Or Uniscope. Among many others.

What we haven't talked about here are a few other capabilities that you have to consider when you consider Raytheon alternatives to 3270 and 3790. One is experience—Raytheon has more than 50,000 terminals and controllers in use today, and is a major manufacturer of digital communications products as well. Another is stability; for the same reason you like IBM, you should consider Raytheon: we are one of the world's largest electronics companies. Another is worldwide dimension. As you distribute your information systems here and abroad, you'll find Raytheon customer and equipment service there and waiting—in more than 120 cities and 35 countries around the globe.

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RPG-II Routines Aid Ad Agencies

LOUISVILLE, Ky. – Advertising agencies considering data processing may get a headstart on their applications, almost regardless of what small system they choose, with the accounting system developed by Zimmer-McClaskey-Lewis, Inc. (ZML), an agency headquartered here.

The software is written in RPG-II and has been installed at ZML on an IBM 3 and then a 32, with the likelihood of being transferred to an IBM 34 early next year.

The package is said to "completely computerize" all accounting functions in an agency and to provide at least one feature – reporting of client gross and net profit – that is significant and generally unavailable in other packages, according to a spokeswoman.

Other functions include both production billing and media billing, aging of unbilled time and inventory, time study and general ledger.

The package is available now and costs from $10,000 to $15,000 depending on the amount of support needed and the contract terms, she noted.

ZML is at 1469 S. Fourth St. (P.O. Box 1137), Louisville, Ky. 40201.

Survey Form Shows Evaluation Method

NORWALK, Conn. – Designed to help users evaluate communications software, the 12-page "Telecommunications Monitor Survey" booklet from Turnkey Systems, Inc. (TSI) may benefit a much larger user base as well. It provides an education on how to organize an evaluation.

The free pamphlet is essentially a "laundry list" of capabilities a user may want in any teleprocessing monitor being considered. But the form of the booklet and the rating method it proposes can be adapted to help in the evaluation of any software.

The list is divided into half a dozen major segments covering very broad topics. With its teleprocessing concern, for example, this particular list focuses on high-level language support, programming aids, error recovery and restart, message management facilities, system facilities and external considerations.

The gross segments are divided into more detailed concerns. The high-level language portion, for instance, is split into categories concerned with Cobol, PL/I and Fortran support. And each of the categories then includes half a dozen or more specific facilities, with room for the user to add more if they are needed.

In some cases there are a great many specific criteria to consider. Under "Interfaces" in the message management facilities grouping, for example, TSI lists 24 items of possible interest to the user, with room left over for others the user may want.

It's up to the user to decide how well the capabilities of any monitor being evaluated meet the specific facilities listed; TSI suggested that a five-point scale.

But the categories themselves have different values to different users and TSI takes that into account by suggesting that the total score each product accumulates in each category be multiplied by a weighting factor. The booklet suggests a three-point scale.

The sum of the individual category scores extended by the weighting factors provides the overall score for the monitor being considered. But TSI stressed in its introduction that the survey form is not intended to be the sole basis for system selection.

The extent of the user's responsibility in that respect is obvious when one realizes the user not only has to do the scoring and the weighting, but even the selection of the software packages to be evaluated. TSI doesn't even print the name of its monitor at the top of one of the product columns.

The survey form can be requested from TSI, 111 East Ave., Norwalk, Conn. 06851.

Independent Building Packages To Help Dibol-11 Programmers

MANLIUS, N.Y. – A trio of packages from Manlius Valley Enterprises (MVE) has been designed to help programmers work more easily in the Digital Equipment Corp. CTS300 environment. One package, Genr8, is ready now and supports Dibol-11 program development in a time-sharing mode, according to a spokesman.

Genr8 aids the programmer in several ways, he said, adding that just by allowing program development work to run alongside production work, rather than requiring a dedicated system, the software eases the time constraints that often face developers.

The package also supports the use of shorthand coding, which it expands into full Dibol phraseology, and a facility that takes care of virtually all punctuation needed to meet the syntax rules of Dibol.

Written in Dibol-11, the package is available in object code under a single-user license for $300.

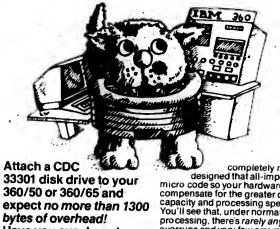
A Time Share Dibol Editor (TSD-Edit) is under development, the spokesman added. Object code for this package, planned for July delivery, is $750.

TSD-Runoff, designed to be the equivalent in function of the Decsystem-10 and RSTS versions of Runoff, is also "in the works," the vendor noted.

Object code for TSD-Runoff (with August delivery expected) is $500. If the Edit and Runoff packages are acquired in combination, the combined license cost drops to $1,150, the spokesman noted.

MVE can be reached through P.O. Box 232, Manlius, N.Y. 13104.

dc Their byte is worse than their bark. dc



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More Equipment RFPs Out

SBS Still Eyeing '81 Service Despite Controversies

By John P. Hebert
Of the CW Staff

WOBURN, Mass. — Despite the controversies generated by the entry of Satellite Business Systems (SBS) into the communications carrier field, the company is going full speed ahead with its plans for full operation in the first quarter of 1981.

And when the SBS offering is operational, it could negatively impact the U.S. Postal Service and the efforts of the Federal Communications Commission (FCC) in trying to make a distinction between computers and communications, according to Deke Hensley, SBS vice-president of technology.

SBS will be offering a "totally new concept" in communications when it begins operation in 1981, Hensley said. Communications traffic will be transmitted digitally at speeds up to 54M bit/sec on the satellite relays and up to 6.3M bit/sec to the user's on-premise antennas, he told attendees.

Heavily budgeted users will be the first to utilize SBS' wide-band transmission facilities, he said, because "local loops are now killing us with major costs."

Each user will be able to allocate satellite facilities tailored to unattended operation; the number and type of communications ports will be user-defined, he explained.

SBS will have two satellites in orbit — an operative one and an active spare — in addition to a spare satellite on the ground. Each satellite will have 10 transponders with a relay capability of 54M bit/sec.

The firm has already sent out request for proposals (RFP) for radio frequency (RF) terminals and burst modems, and it has already completed a few case studies of large organizations, in addition to 25 case studies of smaller companies, according to Hensley.

SBS' plans have not changed even though the Justice Department is investigating the possibility of antitrust violations [CW, June 6] and even though the SBS vice-president predicted his firm's service could impact the operation of government agencies, notably the Postal Service.

The Justice Department is not focusing on the larger issue of whether IBM should be a part of the joint SBS venture with Aetna Life & Casualty Co. and Communications Satellite Corp., Hensley pointed out.

Meanwhile, the FCC believes it should clean up the gray area between computers and communications, Hensley said, referring to the commission's ongoing Computer Inquiry.

The FCC may be working against itself in granting approval to SBS, he indicated, because SBS will create an even greater smokescreen over whatever distinctions may now exist between the two areas.

Another threat spawned by the operation of SBS and other such communications carriers in the 1980s could be the displacement of a large part of the U.S. Postal Service's staple diet — intracompany business mail, which Hensley said comprises more than 50% of the mail volume today.

"SBS could be doing a lot of the Postal Service's work" because SBS is aiming its resources at a replacement method for sending exactly this type of mail, he said.

"We foresee entirely new ways of doing business, with digital facsimile transmission at the forefront of hard-copy transmission," he said.

"[SBS] sees the 1980s as the time period in which the slogan 'High-speed, low-cost data transmission capabilities for all' will be true — and not just from SBS offerings."

The lower cost of the satellite services displacing more costly existing carriers' methods could save very large users $3 million to $4 million, he said.

But there will be an enormous impact on the productivity of a corporation and personnel within it, which, for the same firm, could be in the $30 million to $40 million range, according to the SBS vice-president.

SBS will offer "a total system with total network capability," Hensley said.

Advances to Allow Integration

Panel Agrees Multipurpose Terminals Coming

By Ronald A. Frank
Of the CW Staff

NEW YORK — Decreasing hardware costs are one of the major factors affecting data communications systems. That was the consensus of speakers at a recent seminar here on the effects of digital transmission.

As technological advances make multipurpose terminal equipment more feasible, users will begin to integrate communications functions that are now separate, speakers agreed at the seminar sponsored by The Yankee Group, a consulting firm.

The costs of future on-line systems will be dominated by labor and communications instead of hardware, according to Dr. Howard Frank, president of Network Analysis Corp. Although users are not quite ready to integrate data and voice functions in their communications nets, that day is coming, he predicted.

By 1985 data transmission and switching will account for 80% of network costs; terminals, modems and related communications devices will account for 10%; and CPU and storage devices will account for another 10%, Frank said. In 1970, data transmission and switching costs totaled 40% of typical network expenses; terminals, modems and similar devices accounted for 15%; and CPU and storage accounted for 45%.

Included in newer communications options, Frank listed virtual circuits operating in packet nets, packetized voice transmission and integrated switching. The dominant costs of networks lie in the local access charges and this figure can be as high as 50%, he said.

"The backbone transmission costs and switching costs share the remaining price of a network on a roughly even basis, he said.

Regulatory Clashes

Dr. Manly Irwin, regulatory economist and consultant from the University of New Hampshire, said technological advances had spurred the regulatory clashes now taking place between computers and communications.

Technology changes have reduced costs and, as a result, new profit potentials have arisen. It is the prospect of these profits that are behind such issues as the AT&T Dataspeed 40/4, Satellite Business Systems (SBS) and the second Computer Inquiry, he said.

The communications industry has been affected by advances in integrated circuitry, minicomputers, aerospace (satellites) and new specialized carriers. As a result, it has evolved into a flexible, changing "interindustry competition," Irwin said.

Technology does not stop, it creates new products and services — all of which ultimately should benefit the end user, he

(Continued on Page 46)

Spectron Monitor Handles 999 Remote Circuits

MT. LAUREL, N.J. — Spectron Corp. has introduced a remote line monitor selection system designed to bring diagnostics of remote equipment to the central data communications center.

The system monitors digital circuits up to 1,000 feet from the central site and selects up to 999 digital circuits of any type for monitoring without interrupting modem operation, according to the firm.

Parallel connection of the line selection system permits simultaneous or multiple monitoring by several stations. A keyboard with a numeric display makes interface selection a straightforward matter, Spectron added.

The modular system consists of a monitor select station, the MSS-101; LMU-1624 line monitor units; and LSM-24M line select modules, the company noted.

The MSS-101 contains the logic selection equipment and provides the interconnection of the digital interfaces to the monitor bus. Its 10-position keyboard with LED display allows selection and indication of the interface to be monitored.

The LMU contains up to 16 LSMs and can be rack-mounted or installed under a raised floor, for example, Spectron added.

RS-232 interface connectors are hardwired with each signal lead bridged by a switch contact and connected to an internal common bus of the LMU module, a spokesman noted.

The digital line monitoring system can also be connected to other communications test equipment to diagnose the analog portions of communications links from a central site, according to the spokesman.

The price of the MSS is $650 and includes the keyboard and LED display. An LMU costs $640; each LSM costs $110. Spectron is at Church Road and Roland Ave., Mt. Laurel, N.J. 08057.

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'Ideal' Distributed System Eliminates Worries: User

By Ronald A. Frank
Of the CW Staff

PHILADELPHIA — In the ideal distributed system, the user should not have to worry about what processing and which associated data bases are to be distributed, according to Frank Finch, manager of on-line systems at E.R. Squibb.

Speaking at a recent Computer Caravan session here, Finch described how Squibb built an on-line order entry inventory distribution system using Digital Equipment Corp. PDP-11/70 minicomputers.

The company had been using an IBM 360/20 that had reached its maximum potential operating with nine remote sites in 2780 mode, he said. The PDP-11/70s were installed at the nine regional centers. They now are part of a network which includes a 370/155 at the firm's headquarters in East Brunswick, N.J.

By upgrading to the PDP-11/70 network, it was possible to increase invoice throughput from 30 per hour to 300 per hour. Most processing is done between the PDP-11/70s and the CRTs connected to them.

The links between the master centers and their remote terminals include Codex 6000 network processors running on 9,600 bit/-sec lines. These processors allow multiplexing of the leased lines for most efficient use of the terminals, Finch said.

In addition, the centers also have terminals connected directly to ports on the DEC processors. Communications between the nine master centers and the central DP site is done over 3,600 bit/sec dial-up lines with ICC modems. The orders are transmitted using 2780 protocol for entry into the 370. The system is now handling about 1,600 orders per day from the nine master centers. The network was configured so it would not require extensive technical knowledge on the part of the terminal operator at the remote site, he continued.

At the present time, the master centers are transmitting their data to the New Jersey center after initial processing is done on the 11/70s.

One of the upgrade goals described by Finch would be to configure the DEC processors into a ring network so they could interact with each other as well as communicate with the DP center.

Experience with the Decnet software for the 11/70s has been generally favorable, but some of the currently planned network upgrades are waiting for promised software support, Finch said.

By getting the DP power down to the source level at the remote sites, there has been less reliance on external factors. Users are more receptive to working with the system when they know they have responsibility for the accuracy of the entered data.

IDS Minitech Allows Switching, Testing of Up to 64 Channels

PROVIDENCE, R.I. — International Data Sciences, Inc. (IDS) has a system that allows switching, patching, monitoring and testing of up to 64 channels at both the RS-232 data interface or voice frequency line interface, according to the vendor.

The IDS Minitech Control Center provides front-end processor channel switching singly or in groups. Switching can be controlled manually at the Minitech front panel or optionally from the remote location, IDS said.

Testing at the digital interface is provided by the control center's integrated test set and includes bit, block and character error rate testing as well as bias distortion monitoring, the company added.

Automatic Tests

Error rate vs. time-of-day tests are said to be automatically performed and documented on the control center's programmable digital printer.

Voice-side testing is accomplished through tone generation and signal measurement and amplification, an IDS spokesman explained.

The system can be modularly expanded to suit specific network requirements and can be ordered without the equipment to accommodate voice line testing, he said.

A Minitech testing 48 channels with manual switching capabilities, the programmable printer and test sets costs about $20,000. Prices for the Minitech Control Center range from about $15,000 to $25,000.

IDS is located at 100 Nashua St., Providence, R.I. 02904.

Technology Advances To Allow Integration

(Continued from Page 45)

said. Although the issues appear outwardly to be oriented toward differences between communications and computers, the long-term effects of electronic funds transfer and similar questions, the basic controversies stem from a fight to see who will provide the services involved, Irwin said.

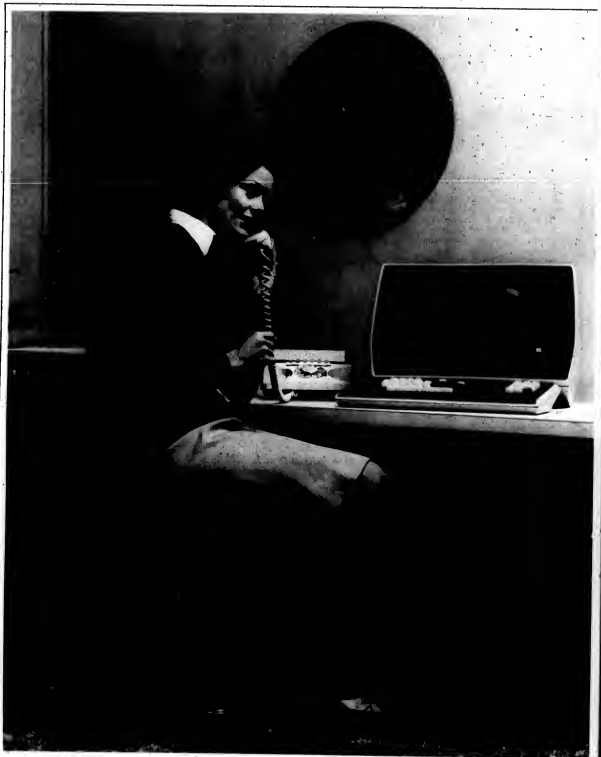
The user's viewpoint was presented by Robert Michels, senior telecommunications analyst at Carson Pirie Scott & Co., Chicago retailers, who described the difficulties of operating digital terminal and DP equipment on analog transmission facilities.

Because of the digital-to-analog-to-digital conversion required in today's networks, "we have to pay for the cost of the middleman — the modem and the multiplexer," Michels said.

Digital networks should solve two major problems that exist today — the inadequate variety of bandwidths and the cumulative buildup of noise with analog network repeaters, he said.

Digital transmission can help reduce the effect of circuit noise, increase the bit rate on a given transmission medium and simplify the mixing of data, voice and video to minimize total costs for users, he explained.

Tom Rush, advanced application development manager of SBS, told the seminar attendees that the digital satellite system being planned by his firm will optimize such applications as document transmission using facsimile devices and teleconferencing to cut transportation costs for corporations.



Decision Introduces RJE System

HORSHAM, Pa. – Decision Data Computer Corp. has introduced a data communications system which is said to allow users to combine punch card and printer devices in remote job entry (RJE) applications.

The CS 780 system is an RJE terminal that emulates the IBM 2780 remote batch terminal, according to a spokesman. Unlike the IBM 2780, however, the Decision Data terminal reportedly offers a broad selection of card devices and line printer capabilities.

A user can select either one or two, 80- or 96-column card devices and/or a line printer that operates at 300-, 450-, 600- or 900 line/min, the spokesman said.

The CS 780 transmits and receives in a half-duplex synchronous mode in IBM 2780 protocol at transmission speeds up to 9,600 bit/sec.

Both Ascii and Ebcdic codes can be utilized by the system. In the Ebcdic mode, the 780's transparency feature permits transmission and/or reception of all 256 Ebcdic codes, it added.

The system can operate on any voice-grade communications line; and private or leased lines can be used on a point-to-point basis, according to a Decision Data spokesman.

Additional features that enhance the data recorder are available as options, the spokesman noted.

A receive-only (print) configuration of the CS 780 costs $510/mo on a three-year lease and sells for $14,170. A card reader, punch and print terminal with the off-line data entry capability is priced at $815/mo on a three-year lease and sells for $24,110.

Deliveries of the CS 780 will begin this fall, the company said from 100 Witmer Road, Horsham, Pa. 19044.

TEC Extends Peripherals Line With 8080-Based Model 70

TUCSON, Ariz. – TEC, Inc. has extended its peripheral equipment line with the microprocessor-based Micro-Tec Model 70 CRT display.

The Model 70 is said to provide a limited graphics capability of solid vertical and horizontal lines to enhance format design. It also has limited editing features such as character/line insert and delete and clear to end of line, page or field, according to a spokesman.

The unit has 15 transmission rates up to 9,600 bit/sec that are switch-selectable, as are parity and half- and full-duplex or buffered operating modes, he added.

Interfaces offered as standard equipment are RS-232, current-loop and TTL, which are all said to be compatible with Bell 103A and 202C-type modems.

Upper- and lower-case characters are standard, and a special monitor mode permits display of all 128 Ascii codes for programming and diagnostic functions, TEC stated.

Terminal Transactions

Absolute cursor addressing and reading and data compression of transmitted data are also featured in the basic terminal, the company added.

The Micro-Tec incorporates eight function keys that are user-definable. Each function key can generate up to four discrete codes and can be combined with shift and control keys to generate 32 different sequences or 128 codes, according to the TEC spokesman.

The Model 70 includes a pedestal base which allows the screen to swivel and tilt. The CRT can display in an 80-char. by 25-line format.

Optional Features

Optional features or capabilities include polling and paging. The optional CRT Saver reduces screen intensity when the unit has not been operated in a preset amount of time to eliminate wear of the screen phosphor, the spokesman noted.

Other options include TEC's patented Data Panel, a 16-window mini display on the CRT bevel plate; printer interfaces; and selectable transmission rates for sending or receiving, he added.

The basic Micro-Tec Model 70 CRT costs $1,450; a detachable keyboard costs an additional $275. Prices for the options have not yet been set, the spokesman said.

The terminal will be available at the end of July, he noted from 2727 N. Fairview Ave., Tucson, Ariz. 85705.

Raytheon Has Reader For PTS-100 CRTs

NORWOOD, Mass. – Raytheon Data Systems Co. has introduced a magnetic-stripe credit card reader for use with its PTS-100 series of programmable terminal systems as an extension of the terminals' keyboards.

The microprocessor-based Model 6150-01 decodes the information contained on stripes of magnetic tape embedded in plastic credit cards. It reads codes compatible with Ansi specifications as well as International Air Travel Association and American Banking Association data formats, according to Raytheon.

Information from credit cards' magnetic stripes is decoded, stored in the reader until a valid "end of data" is detected and then transmitted to the processor as keyboard data, Raytheon said.

PTS-100 systems operating in emulation of IBM 2260, 3270 or Fam/Ipam can support the credit card reader; information on magnetic stripes can optionally be displayed at remote sites, the company added.

PTS-100 display station operators can verify the accuracy of cards presented, enter whatever additional information is required and transmit data to a host mainframe for authorization.

The Model 6150-01 reader sells for $750 and rents for $35/mo.

Delivery takes 90 days from Raytheon at 1415 Boston-Providence Turnpike, Norwood, Mass. 02062.

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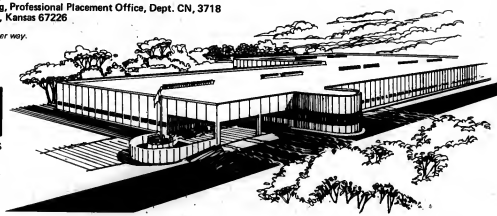

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Gradual Implementation

Shop Floor Systems Sensitive to Workers' Habits

By Lawrence Hartge Jr.
Special to Computerworld

MOUNTAIN VIEW, Calif. — In our fabrication shop here, 95 production employees record an average of 225 work-processed transactions daily.

Before last year, employees used to mark sense cards for off-line data collection, but this task produced an error rate of approximately 22% due to the manual constraints on mark sense cards. And because of scheduling off-line data entry into a batch-oriented computer system, labor voucher reports were produced only on a daily basis.

Now there are three on-line data entry terminals located throughout the shop, which

A shear operator, upon finishing a job, inserts his employee badge and a work order card into a shop terminal and keys in variable information identifying the job operation and the required time.

fabricates and finishes metal and plastic parts for various Hewlett-Packard divisions that produce computer systems and related peripheral devices. As a result, the time required for workers to enter production transactions is minimal; errors are practically nonexistent; and, with an on-line system, the labor voucher report is available whenever required, no less frequently than once daily.

Equally gratifying, the Real Time Manufacturing Information Control System (Remics) has been enthusiastically accepted by our employees in the fabrication shop — a mix involving a sheetmetal shop, a conventional machine shop, numerical control machine shop, a paint shop and a finishing shop.

The basic reason for the system's acceptance is that Remics is tailored to meet the needs of our people, rather than, as is too commonly the case, the system's users being forced to change their work habits to meet the requirements of the system.

Consider the Remics training and operational manual, for example. There is none. We strongly felt from the systems conception, that if manuals were required, the system would be regarded with suspicion by production workers.

In addition, codes of operations on a particular machine could easily have been reconfigured to be more compatible with our computer system. But rather than force our employees to learn a new set of codes, the familiar codes were retained and the computer, through a simple table look-up process, translates the codes to more efficient equivalents for actual processing.

Familiar forms are also retained. The terminals, a hybrid of a Panasonic badge/card reader and an HP video display device, accept our age-old tabulating cards to record a work order number. Therefore, only variable data, peculiar to a specific transaction, needs to be entered by keystrokes.

Taking advantage of the capabilities, of visual display terminals, employees are guided through the entire transaction process: requests for data are given in the proper sequence, information entered is sight-verified before being validated by the computer and options for various actions are listed.

Training employees to use the new system was a simple matter. Initially, the terminals were placed on the production floor for testing. This piqued the curiosity of many workers who sought explanations and were informally trained in the use of Remics before the cutover.

Employees were also kept informed about system design and implementation progress through an internal shop newsletter. And Remics was promoted as a helpful "tool" via posters displayed prominently throughout the fabrication shop. Passing these preliminary training steps established confidence on the part of any skeptical workers.

Next we trained supervisors, a 20-minute task, then role played for 15 minutes with typical questions we had anticipated the workers would later ask them. Later the same day, supervisors demonstrated the terminals in small groups.

The next day the system went live with an option: anyone not understanding it could use the old mark sense cards. To our delight, no one chose the option.

The system is used basically for three types of transactions: logging off completed jobs, uncompleted jobs (usually at the end of a shift) and for special labor, or rework, account billings.

Here's an illustration of an employee logging off a completed operation. (Large type represents visual displays; the small type is the explanation.)

- INSERT BADGE — THEN ENTER ONE DIGIT TRANSACTION CODE — PRESS SEND YOU'RE LOGGING OFF A COMPLETED JOB — YOU ENTERED 03179
- After inserting his badge (his key to the system), entering "1" and depressing the send key, the terminal responds that the employee is "logging off a completed job", and verifies the employee number read from the badge, 03179
- REMOVE BADGE — INSERT WORK ORDER CARD — PRESS SEND — YOU ENTERED 237980

Upon removing his badge and inserting the work order, the employee is able to verify a display of the work order number read (237980).

- ENTER TWO DIGIT DIVISION CODE OF ORDER — PRESS SEND — YOU ENTERED 22
- ENTER THREE DIGIT SEQUENCE NUMBER — PRESS SEND — YOU ENTERED 130

(Continued on Page 52)

10 Firms Share Backup Disaster Facility

MILWAUKEE, Wis. — Ten foundry/manufacturing firms have formed a consortium here to lease almost 6,000 square feet of building space that can be utilized as a backup DP facility in the event of a disaster.

The building, which is equipped with 25 telephones, air conditioning and auxiliary power supplies, contains no computer hardware and will remain vacant until an emergency situation forces its use.

"One aspect of disaster planning that may be difficult to provide for is to have space available to install replacement equipment in the event that a computer site is damaged to the extent it is rendered unusable," a spokesman for the group noted. "Vendors have a good track record in delivering replacement equipment, but space that is available today may not be available when it is required," he added.

"Installed power, air conditioning, humidity controls and the availability of telephone lines for telecommunication is more of a problem than space," he noted.

Early in 1976, a group of users (without regard for hardware vendor) met with the owners of a former computer site that was vacant. They began to examine the feasibility of leasing the site for a standby location.

The building under consideration was a one-story modern brick building with ample parking and a loading dock. It is convenient to a major expressway, close to a fire station, in a low crime area and not susceptible to flooding. It had a 30 kVA transformer and a 15-ton air conditioner installed. Partition walls and raised floor were available.

Many factors affected the potential leasing of the facility including cost, insurance, access, additional power and air conditioning requirements, and telephone needs.

Eventually, the group decided upon a three-year lease with an option to renew. In addition, the firms agreed on 100 kVA of isolated power and 300,000 BTU/hour of air conditioning, according to the spokesman. Twenty-five telephones were installed at a cost of $750, which reserved the lines, an operation which carries a $92/mo fee in a nonoperational standby basis.

Under the agreement, each user pays $100/mo toward the cost of maintaining the standby facility. Membership is being limited to 40 companies, the spokesman said.

Since the site was designed to house any vendor's equipment, within limit, the installation managers from five major mainframe manufacturers were invited to tour the site and go over specifications with the group. Inputs from the managers were included in the group's specifications for power, air conditioning and layout of the location.

Users of Honeywell and IBM equipment are members of the group and the spokesman indicated a Burroughs user will be joining the group shortly. He also said the participating firms seek a degree of anonymity for security purposes.

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SALES AND MAINTENANCE OFFICES THROUGHOUT THE US AND CANADA

Protecting the DP Center — Part 2

Strict Preventive Measures Can Avert Fire Calamity

By Irving M. Crupar
Special to Computerworld

To achieve physical protection against fire, the following specifications will serve as guidelines:

- The computer area should be housed in a fire-resistant, noncombustible or sprinklered building.
- The computer/DP system should be so located as to minimize fire, water and smoke exposure from adjoining areas and activities.
- The computer room should not be located above, below or adjacent to areas or other structures where hazardous processes are located, unless protective features are provided.
- The computer/DP system should be housed in a room of noncombustible construction. All materials including walls, floors, partitions, finish, acoustical treatment, raised floors, raised floor supports, suspended ceilings and other construction involved in the computer room should have a flame-spread rating of 25 or less (see National Fire Protection Association Standard Method of Test of Surface Burning Characteristics of Building Materials, No. 255, 1966).
- Floor covering materials, such as asphalt, rubber or, vinyl floor tiles, linoleum, high-pressure elastic laminates or carpeting may be used to cover any exposed floors.
- In multistory buildings, the floor above the computer room should be made reasonably watertight to avoid water damage to equipment. Openings, including those for beams and pipes, should be sealed to watertightness.
- Provisions should be made for automatic positive drainage of the floor surface to minimize damage to the system and associated wiring due to flooding, sprinkler operation, coolant leakage and the like.
- The computer room should be cut off from other rooms within the building by noncombustible, fire-resistance-rated walls, floors and ceiling. The fire-resistant walls or partitions enclosing the computer room should extend from the structural floor to the structural floor above or the roof.
- Decking for raised floors should be of concrete, steel, aluminum or other noncombustible material; pressure-impregnated fire-retardant treated lumber; or wood or similar core material which is encased on the top and bottom with sheet, cast or extruded metal, with all openings or cut edges covered with metal or plastic clips or grommets so that none of the core is exposed.
- Openings in raised floors for electric cables or other uses should be protected to minimize the entrance of debris or other combustibles beneath the floor. This may be accomplished by noncombustible covers, grilles or screens or by locating equipment directly over the openings.

This is the second in a four-part series on physical security of the computer center by Irving M. Crupar of the Wackenhut Corp. The series is extracted from a chapter in the Automatic Data Processing Handbook, *copyright 1977 by McGraw-Hill, Inc.*

This week, Crupar gives a fire protection checklist for computer room facilities. Next week will examine electronic detection devices.

- All office furniture in the computer room should be of metal construction or other materials that do not contribute significantly to the combustible content.
- Small supervisory office and similar light-hazard operations directly related to the electronic equipment operations may be located within the computer room if all furnishings are noncombustible and adequate facilities are provided for containing the necessary combustible material. Supplies of paper or other combustible material should be strictly limited to the minimum need for safe, efficient operations.

The following should not be permitted within the computer room:

- Any activity or occupancy not directly associated with the electronic computer system(s) involved.
- Supplies of papers or other combustible material in excess of those necessary for efficient operation.
- Service and repair shops and operations. Servicing and repairing may be performed directly on machines only when it is impractical to remove them from the computer room.
- Bulk storage of records.
- Any other combustible material, equipment or operation which constitutes a hazard and which can be removed.

When the DP centers went "behind walls," the draperies and other superfluous decorations tended to disappear. However, a serious fire hazard from paper still exists. The operation of a computer system normally requires considerable quantities of cards, stationery supplies and other combustible support materials.

Paper stock, unused recording media and other combustibles that must be retained in the computer room should be kept in totally enclosed metal file cases or cabinets.

A most urgent anti-fire precaution is to forbid smoking in the computer center. Also, since fires can occur from electrical wiring, it is extremely important that DP personnel be warned to be alert to burning odors which may be a symptom of a short circuit in the wiring and a possible smoldering fire. It is essential that fires in the computer center be found at the smoldering stage, before extensive damage has been done to the DP equipment.

Magnetic tapes should be stored in containers, and these containers should be stored in metal fireproof cabinets. Each tape available in the DP center with proprietary information should be duplicated and retained at a remote location.

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By removing all of the complexities between the byte multiplexer channel of your host CPU and the remote devices it communicates with, PIX-II makes those devices appear to the CPU to be in local mode.

Stop for a minute and think about what that means to your current and future plans for using 3270-type data entry devices. It means seven benefits that would otherwise be unobtainable anywhere.

First, it means you can build a 3270 network virtually overnight, regardless of your current processor model or software system, and without any front-end hardware or software. A PIX-II local controller installs on you CPU's byte multiplexer channel, taking the place of a 3272 local controller. A PIX-II remote controller installs at each remote site, with a 3272 local controller. The 3271 remote controller is eliminated. The installation takes a day, requires no software modification, and gives you—immediately— a completely operational 3270 network.

Second, that installation now puts all of your 3277-type terminals in local mode, as if they were right at your host CPU site, attached to a byte MUX channel.

Third, now that your CRT stations are in local mode, polling is totally eliminated. Every 3277 is served on a demand basis, as if it were the only terminal on the network. Nor is there any need for polling software overhead. You don't need it..

Fourth, the result of this systems configuration is improved response time for every 3277, regardless of its location. On average, that improvement will be about four times better than what you now achieve: from an average of eight seconds, to just under two seconds. For *every* 3277, consistently.

Fifth, no remote terminal access software is needed. None. No remote BTAM or remote TCAM if you operate under non-virtual methods. No VTAM and related NCP front-end software (there is no front-end) if you operate under virtual technology. That feature alone saves you months of effort.

Sixth, whether you operate under bisynch or SDLC now, PIX-II immediately gives you all of the benefits and speed potentials of SDLC, with no development work required. None. The PIX-II data link operates at speeds up to 56KB, so all you have to do is specify the type and speed of communications link—from a 1200 baud leased line to a 56KB satellite link. PIX-II takes it from there.

Seventh, putting up an instant 3270 network is just the beginnings of what you can do with PIX-II. Once it's installed, you can attach remote peripherals, HASP or JES work stations, console controllers, and even use it to develop a true CPU-to-CPU link without ACF.

You'll also like the price. PIX-II costs less than the equipment it replaces—far less in some cases. Its greatest virtue, however, is that it lets you do right now what you'd like to do right now—with virtually no effort required.

Find out more about PIX-II. Send us the coupon or call our nearest sales office. PIX-II: the beginning of tomorrow's 3270 networks.

The Secret of PIX-II's Data Link Efficiency

The above illustration depicts the typical sequence involved in exchanging a single 3270 transaction under IBM protocol—and the many little ways in which PIX II eliminates or reduces many of these sequences.

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Formatting Flexibility Helps Speed Data Handling

KANSAS CITY, Mo. — In the data processing service industry, data handling efficiency and fast throughput aren't simply good ideas — they're necessities.

Like other service bureaus, Software and Systems Management, Inc. (SSMI) here serves a diversity of clients, the largest concentration being in the garment manufacturing industry. SSMI's clients have a variety of DP requirements, which places a premium on efficient data entry.

In May of 1976, the company installed a Data 100 Keybatch system, replacing a Four-Phase data entry system which had been in use for about a year. The system has yielded the improvements the company was looking for in such areas as updating, reformatting, flexibility and internal control, according to Robert P. Wahlstedt, president. The result has been a 25% throughput increase, he added.

The system consists of eight keystations, a terminal control unit, a 5M-byte disk and magnetic tape units. Data is batched on disk, output to tape and then processed on the company's IBM 360/40.

According to Patricia J. Ward, data conversion supervisor, the system greatly increased the company's flexibility in serving clients whose requirements vary considerably. The software and operator-oriented features of the system are the main reasons for increased productivity, she said.

"It's a remarkably easy system to adapt to," she stated. SSMI uses mostly part-time personnel for data entry and "it doesn't do any good to have a lot of capability if the operators can't understand the system."

She said a well-trained operator with previous experience can become fully productive in a couple of days. New trainees with little or no practical experience on key entry systems are able to achieve complete familiarity within two weeks or less. After that, it's a matter of building up speed "and it's amazing how productivity picks up."

A great deal of the improvement in efficiency can be attributed to the reformatting capabilities when data is output to tape. Under the previous system each record entered had to be 80 columns, regardless of how many columns were needed, and every constant in a particular job had to be manually duplicated on every record.

Besides taking a lot of operator time, this meant the disk filled up so fast that records had to be written on tape almost immediately and the disk data deleted. If for some reason the data on tape was unreadable, the entire record had to be rekeyed because it was no longer in the system. If an error occurred in the duplication process, the operator either had to cancel and rekey the entire batch or manually change each individual item.

Under Keybatch, constants for a particular job entry or update need be entered only during the programming end. The system automatically enters the constants on all records and expands each record to 80 columns when writing to tape.

If a mistake is made in duplication, the operator need only change the first record and the system corrects the remainder. Because less space is required on the disk, records do not have to be deleted as often, allowing data on tape to be read, checked and corrected if necessary, without the need for a complete reentry from the keystation.

The system will handle records greater than 80 columns — as many as 300 columns, for some jobs. Formatting flexibility is important in a system that must deal with as many as 30 different types of input.

The system allows up to 99 format levels per job, compared with six previously. Formerly, each document had its own number, leading to confusion for the operator. Now, a single number covers all format levels in a particular job.

Internal checks built into the software also save operator time, according to Ward. The system can be programmed through the use of tables to accept only certain required items that go into a field. If these internal checks are violated through insertion of incorrect, out-of-place or too many characters, the system automatically stops and displays the error for the operator.

SSMI uses the statistical features of the system to provide an incentive program for data entry operators. Records are accumulated indicating production totals for all operators, and a weekly bonus is given to the operator with the highest average for certain transactions.

Although all the keystations at present are local, Wahlstedt said the company is considering adding remote keystations in other parts of the city to serve several of its larger clients.

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Production Shop System Sensitive To Workers' Habits, Capabilities

(Continued from Page 49)

- ENTER THREE DIGIT OPERATION NUMBER — PRESS SEND — YOU ENTERED 120

The worker then enters a division code, which represents the HP division the job will be charged to by corporate accounting; a sequence number, which is the sequence of the job on a particular work order; and the operation number, which could represent a shear, Weideman press, vibratory deburr or one of numerous operations.

- ENTER QUANTITY COMPLETED — PRESS SEND — YOU ENTERED 500
- ENTER TOTAL RUN TIME — PRESS SEND — YOU ENTERED 2:5
- ENTER SET-UP TIME — PRESS SEND — YOU ENTERED .25

Data entry is completed by entering the quantity of parts involved, the set-up time and run time.

- PRESS SEND IF TRANSACTION IS OK — OTHERWISE CANCEL TRANSACTION

Each entry has been computer checked for validity. The completed display allows the employee a final opportunity to verify entries. Depressing the "send" key completes the transaction.

In the event that work performed is not represented by a standard work order process, a special labor accounting billing transaction is used. Since there are nine different kinds of rework involved, rework codes and their descriptions are flashed upon the video screen to aid the worker in making his selection of the proper rework code to enter.

The capabilities of Remics extend far beyond the shop floor. Expediters will not be required to assure that jobs are being worked on in the proper sequence. Production control personnel will be able to reroute or reschedule a work order. Orders may be "partialed," that is, treated as split jobs. Orders may be scheduled to "runs" or specific due dates. And with the on-line system, management may pose hypothetical questions as an aid for capacity planning.

Modular Needs

To easily accommodate these planned additional work loads requires a system that is modular and easily expandable into a distributed network. Currently, our three terminal stations are controlled by one HP 21MX located on the shop floor. Up to 48 terminal stations can be tied to the shop's minicomputer. Special software routines combined with hardware options enable the system to recover from brownouts and power failures without any operator attention. The system is used 24 hours daily.

Remics has received enthusiastic endorsement by employees. It might be said that we have a built-in acceptance factor, since we manufacture the system we use. Many of us, through past experiences with automation, believe the opposite. Our employees, computer-knowledgeable by virtue of their jobs, tend to be more critical, more demanding of automation and less tolerant with system imperfections.

Hartge is a development engineer with HP's Data Systems Division.

Mini Bits

Basic/Four Drops Prices On CRT, Memory Modules

IRVINE, Calif. — Basic/Four Corp. has reduced prices on three components for its small business systems effective June 1, according to the firm.

The CRT, Model 7230, has been cut in price from $4,000 to $3,200, a 20% reduction.

Two memory modules were also affected by the cuts. The 16K module price has been reduced 29%, from $3,500 to $2,500, while the 8K module price has been reduced 33%, from $3,000 to $2,000.

The cost for the minimum configuration did not change, a spokesman noted. The firm can be reached at P.O. Box C19550, Irvine, Calif. 92713.

Decision Dete Printer Designed for IBM 3

HORSHAM, Pa. — The Model 6602 printer from Decision Data Computer Corp. is a 200 line/min. unit designed for the IBM System 3 models 8, 10, 12 and 15.

The unit can accommodate forms with up to six parts and prints a full 63-char. set over a 132-column print line.

The printer costs from $290 to $390 monthly, depending on the lease plan chosen, or it can be purchased for $9,000. Decision Data said from 100 Witmer Road, Horsham, Pa., 19044.

General Robotics Mini Feetures LSI-11 CPU

HARTFORD, Wis. — The General Robotics Corp. has introduced its Executioner III minicomputer/cartridge disk system which features an LSI-11 CPU, double-sized backplane, 20K by 16-bit random-access memory and serial interface.

It costs $18,950 from General Robotics Corp., 55-57 N. Main St., Hartford, Wis. 53027.

Tri-Star Adds Printers

MQORESTOWN, N.J. — Tri-Star Computer Systems, Inc. has added a 70 line/min and a 125 line/min matrix printer for Data General Corp.'s Nova and Eclipse and Digital Equipment Corp.'s PDP-11 minis.

The TMP-70 printer (70 line/min) is a 7 by 7 matrix, bidirectional printing, microprocessor-controlled unit, the firm said. Standard features include spacing of either six- or eight line/in., a single-space switch and choice of 64-, 96- or 128-char. Ascii set.

The TMP-125 printer (125 line/min) is a dual-head, bidirectional unit and includes the same standard features as the TMP-70.

The TS-70 and TS-125 cost $2,725 and $3,375 respectively. Interfaces cost $1,000.

Tri-Star is located at 304 Harper Drive, Moorestown, N.J. 08057.

Equipment, Personnel Reductions

Mini Saves Jewel Firm $120,000/Year

By Esther Surden
Of the CW Staff

PROVIDENCE, R.I. — Almost any small business system user would like to say what Ernest J. Congiliando, vice-president of finance for Lisner/Richelieu here, was able to say — that his company has saved over $120,000/year since the installation of his small business system.

The manufacturer and distributor of fashion costume jewelry has saved about $75,000/year in equipment and processing costs and between $40,000 and $60,000 in people costs, because the system has enabled the firm to cut five people from its staff, Congiliando said.

Before the company decided to try to reduce costs through a minicomputer, it used data entry terminals connected by standard telephone lines to the firm's central computer facility in New York, which had a mainframe, he said.

Because the terminals were used on-line eight hours each day, telephone costs were very high and the terminals were not up as often as the firm would have liked, Congiliando indicated.

Also, plans to develop new or revised program applications had to be described over the telephone to the programmers at the central facility, he said.

The on-line terminals and programming support cost Lisner/Richelieu from $150,000 to $175,000 each year, making them the second largest expense of the company, Congiliando said.

Search for Solution

So in 1975, the firm decided it needed a more effective system. It turned to a certified public accounting firm, but that firm was unable to turn up a solution that was cost-effective. It sent out requests for proposals but came up with systems that cost so much there was little significant savings, he added.

Congiliando said he then called Diversified Data Services (DDS) of East Providence, the service bureau his firm had been using to do some outside work. DDS demonstrated how a small business system from Datapoint Corp. in combination with the service bureau could save money.

At that point, Lisner/Richelieu cancelled its CPA contract and decided to install a Datapoint system.

The configuration first installed by the company included a Datapoint Corp. 2200 processor with two cartridge disks and eight CRTs. The firm found this configuration was not sufficient to get the needed response time so, in 1976, it upgraded to a 5500 processor with 48K of user memory. It also dropped one CRT.

The system allows the operators at seven CRT terminals to input customer orders, accounts receivable, accounts payable, general ledger, payroll and purchase orders and to apply cash applications to customer accounts.

The system also controls physical inventory, provides reports of inventory turnover projections and maintains perpetual inventory record maintenance.

According to a rule established by the firm, all data is verified as soon as it is entered at one of the terminals.

At the end of the day, validated data is transmitted via Datapoint's Datapoll package and standard telephone lines to DDS's own Datapoint system.

The service bureau's system has a magnetic tape drive with which data is recorded and then switched to an IBM 360/40. The jewelry company gets reports on the previous day's activities each morning.

The system has been very reliable, Congiliando stated. Once downtime was caused by the hardware, but the situation was corrected by the next day.

The firm installed a voltage regulator to keep out line surges, he added.

The system costs about $1,800 per month on a three-year lease and service bureau charges are $5,000 per month.

Distribution Gives User Benefits In Accessible and Cohesive Form

By John P. Hebert
Of the CW Staff

WOBURN, Mass. — In large organizations that used to rely on a central site filled with monstrous mainframes, users never received a cohesive product from the computer center. Art Gravina, president of Cybek Corp., told attendees of a recent Computer Caravan here. And there was no way out of this situation until the advent of the minicomputer, according to the consultant helping New York's Citibank to decentralize its operations.

Noting the importance of understanding "the problems and pitfalls of that large organization," Gravina outlined the agony and the ecstasy of the decentralization of mainframes at Citibank.

In the late '60s Citibank had a giant computer center, the people to service it, data entry to feed it, proofing people to ensure its data quality and more people to input the finished data, Gravina said.

There was also user output and, at an institution the size of Citibank, "the net of all [those functions and applications] was a lot of computing."

This concept and practice of the large computer center evolved — and at some point snowballed — into what finally became the necessity for bigger or more computers and personnel to run and feed them.

But the data was still not any closer to the users, Gravina said.

Old Waiting Problem

The bank's users had to wait a long time for their processed data, so it seemed, Gravina said. When the output from a user-requested job came back to him months later, his initial requirements were not satisfied.

In 1966, Citibank had 60,000 people. Now, 30,000 people are doing the job, "which should give you an idea of how much automation" has been employed there over the years, he told attendees.

The bank's goal, he said, was to eventually decentralize the computing function down to the user level to develop user familiarity with DP problems within the bank and to stop the fingerpointing that took place before decentralization.

Each department would be responsible for a small number of corporate (wholesale) end-users of the bank's products and services.

Initial Step

The bank initially broke the central site into four divisions and replaced its very large IBM 370 CPUs with IBM machines in the range of 370/135s, Gravina said.

At this point, there was no minicomputerization.

Eventually, each of the four divisions was split into subdivisions as new applications were needed, "so guys who had never had a computer were given minicomputers for their specific tasks," he said.

After a large number of applications were offloaded onto a combination of Digital Equipment Corp. PDP-11/70s and 11/34s, Data General Corp. Eclipses and Interdata, Inc. 8/32s, the IBM mid-range mainframes were discarded, Gravina stated.

Eventually, Citibank will be at the point where it will discard those replacements, because the bank's final goal is to install dedicated minicomputers at lower and lower organizational levels, he said.

Contrary to attendees' repeated questions and disbelief that this could be advantageous, Gravina said there were "big savings" in going from one large to four large DP centers and in the successive splintering now occurring at the bank.

"Dollars and cents has been the only guiding factor," Gravina noted. That philosophy has cut the bank's costs of providing DP in half and cut the number of

(Continued on Page 54)

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First-Time Small Systems Users Need Basic Software

By Stephen A. Levine
Special to Computerworld

The user who needs a small business system is typically a first-time user of in-house computer equipment and knows relatively little about the intricacies of software specifications and implementation.

In most situations, this end user is looking for a basic accounting system coupled, in some cases, with an additional application involving unique aspects of his business.

In typical cases, the end user unknowingly buys a software package that is a "one-of-a-kind" system for which he may pay dearly in terms of errors, poor operation and a lack of flexibility.

As the system performance becomes worse and the user gets little satisfaction from the firm who supplied the system, that user quickly recognizes his role as a pioneer by the number of "arrows" in his back.

The scenario referenced here is evident in situations in which application software is entirely provided by the OEM, who may also be known as a distributor, supplier, etc.

Here the minicomputer manufacturer has chosen only to supply the hardware, maintenance, operating system and the software development language, but no applications software.

Standard Applications Needed

Although mainframers have approached the problem differently and do supply industry-oriented applications software, a need for standard applications software to suit users of mini-based small business systems exists.

The overwhelming need lies in the basic accounting area, which, for small businesses especially, have a better chance of fitting into a standardized system.

The typical small business organization looks for certain consistent factors when it is making a decision regarding minicomputer software system selection.

These include reliable operation, reasonable flexibility with regard to the business, good reference users' experience, ease of operation, upward growth path with consistent compatibility; competitive costs by functional application; more timely acquisition process, security of having alternatives for future support and other similar issues.

Readers are urged to reply to this or any other Minicomputer Exchange article. This is your column, a chance for you to exchange views on the various topics confronting the minicomputer user, a chance to tell the vendors what you are thinking and to let your fellow mini users know obut pitfalls or new techniques in this area. Letters or manuscripts should be addressed to Minicomputer Exchange, Computerworld, 797 Washington St., Newton, Mass. 02160. Double space please.

Since this represents much of what has already been achieved with the large-scale computer system user through the use of a variety of very successful software application packages, it is even more likely that similar results could be achieved for the minicomputer end user.

Possibly, even better successes can be achieved because of the larger number of potential installations, the relatively simpler nature of the business requirements and the fact the user will be working with technical support from an OEM or equivalent.

Significant Benefits Reaped

The benefits of this approach to the manufacturers are probably as significant. They will also find less "arrows" in their backs" from disgruntled buyers.

They could increase the productivity of their installers and could increase the demand for systems.

They could increase their profit margins by supplying, for a fee, the basic software package and other similar advantages could accrue to them.

The systems organization (OEM, etc.) would also gain significantly in that it would be able to achieve direct labor savings and concentrate on unique customer requirements. It would also be able to approach a level of standardization for improving client support services and could represent a more credible capability in a very competitive market place.

Who Shall Develop It?

Who shall develop this type of software package — the OEM, distributor, supplier; the packaged software firms; or other organizations?

Sometime, somehow, each type of these firms will probably produce a package for at least one hardware system. Some firms are already doing this with varying degrees of success.

But the resources required to truly develop a flexible and well documented software system are probably beyond the means of most firms.

Therefore, the most likely organizations to fund this type of work are those who are large enough to staff it and are very familiar with the hardware system for which it will be intended.

Ultimately, the pioneering stage of the small business applications of minicomputers will give way to more reliable practices.

Levine is president of The EDP Corp. (TEC) in Newton, Mass.

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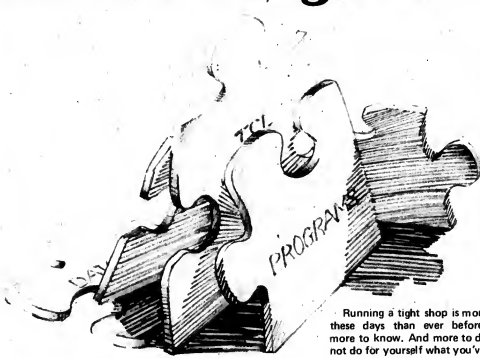

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DDP's End Products Offer Users Benefits

(Continued from Page 53)

personnel in half, he said.

Citibank now has no in-house programmers, he added, explaining that once outside programmer-consultants complete the task of bringing up a mini installation, they leave the site and also leave the DP responsibility with the operating group and operations manager.

Citibank, Gravina stressed, wants to leave a working computer with the department user.

At present, the dedicated minicomputers communicate with other departments' systems via 80% tape transfer and 20% direct machine-to-machine transfer.

Because there are more personnel and a smaller number of users watching over one system for which they are responsible, the minicomputers have proven more secure than their larger system counterparts.

In the future, the bank will begin the task of decentralizing its retail computer operations to the point where a terminal will become the customer's banking office, so that users can have access to the data, he said.

In addition, all of the minicomputers will communicate with each other through a general on-line accounting and reconciling system, he said.

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Floppy Has Choice of Interface

MOUNTAIN VIEW, Calif. – Tri-Data Corp.'s Flexifile 11 microprocessor-controlled floppy disk system is an intelligent device that comes with a choice of RS-232 coupler or 8-bit parallel interfaces, according to the firm.

The unit, which can be used in "a broad range of DP and data communications applications," offers off-line capture, editing, search and forwarding of data.

Consisting of single or dual disk drives, an Intel 8080A-type microprocessor, associated electronics and a power supply, the system accommodates from 4K to 12K of random access memory. The power supply can drive either one or two drives, mounted side by side, the firm noted.

Equipped with the RS-232 interface, the Flexifile 11 accommodates a terminal and a data set at independent transmission rates, providing on- or off-line storage, editing and batching capabilities. The Flexifile also acts as a peripheral or controlling device for program loading and on-line storage when equipped with the 8-bit bus interface, according to a spokesman.

The unit's front panel features panel mode select switches so the operator can select current operating mode, the firm added.

Available in either desktop or rack-mounted configurations, the system costs $1,995. Tri-Data is located at 800 Maude Ave., Mountain View, Calif. 94043.

Peripheral Controls Put on Board

CANTON, Mass. – An interface board providing up to six peripheral controls and a real-time clock in a single CPU slot for Data General Nova and Eclipse series, Digital Computer Controls (DCC) and Keronix minicomputers has been introduced by Gen/Comp, Inc.

The 3021 Series multifunction peripheral control is a single board that will replace up to four I/O circuit boards, the company said.

The 3021 provides a line printer control, card reader control, paper tape reader control, paper tape punch control, a real-time clock and two independent terminal interfaces which are compatible with teletypewriters, CRT terminals and other standard serial data protocol equipment.

The interface board is available in more than 40 configurations beginning at $500 from Gen/Comp, 6 Algonquin Road, Canton, Mass. 02021.

Datum Adds Memory Systems for IBM Series/1

ANAHEIM, Calif. – Datum, Inc.'s family of add-on peripheral memory systems for the IBM Series/1 includes a magnetic tape memory system and a removable media disk system.

The tape system incorporates a universal user's adapter, which allows the connection of external devices to the input/output bus of models 3 or 5 of the IBM Series/1 computers.

User-Tailored System

With the adapter, users can tailor their systems exactly to their own needs, the firm said. The 7- or 9-track system permits recording densities of 200 bit/in. NRZ through 1,600 bit/in. phase-encoded and speeds of from 12.5 in./sec through 125 in./sec. Up to four transports can be used, Datum said.

The 5440-type disk system also incorporates the universal user's adapter and is said to be software-compatible with the IBM 4962 disk storage unit.

The adapter also enables Series/1 users to interconnect several computers at once, the firm said.

Cost of either the tape or disk system is $11,950 from the firm at 170 E. Liberty Ave., Anaheim, Calif. 92801.

Disk Memory System Replaces DEC Drives

HAWTHORNE, Calif. – General Instrument Corp. has introduced a head-per-track magnetic disk memory system that is said to be hardware and software transparent to the Digital Equipment Corp. RSX 11M and a direct replacement for the DEC RJS04 drives.

Designated the System-70, it is standard 19-in. rack-mountable with field-selectable spare tracks. It includes daisy chain capability to 2M bytes and is expandable to 32M, the firm said.

Dual-Port Controller

The system features an average access time of 8.3 msec and a transfer rate up to 512 word/sec. Nominal rotational speed is 3,600 rev/min, the company added.

The System-70 also has dual port controller to two DEC-compatible cables, intercoupler interfaces and communication with main memory and the CPU. Up to four series 700 drives can be attached per System-70 controller, according to a company spokesman.

The System-70 costs $13,482 from General Instrument, 13040 South Cerise Ave., Hawthorne, Calif. 90250.

32-Bit Intelligent Cable Offers LSI Interface

IRVINE, Calif. – A device said to give users a low-cost means of interfacing parallel, multi-byte-wide devices to any minicomputer in Computer Automation, Inc.'s LSI series has been announced by the firm.

The 32-bit general-purpose intelligent cable (GPIC), primarily designed for OEMs, interfaces directly with most low- to medium-speed devices, the firm said.

Selectable Word Length

The word width of the unit is selectable in 8-bit increments up to 32 bits. Output data into the 32-bit GPIC is stored in a 32-bit buffer controlled by a Picoprocessor, which is a miniature digital processor microprogrammed to provide protocol sequencing and status/error checking with all modes of I/O programming, CA explained.

The Picoprocessor is embedded in an intelligent cable, the firm noted.

The GPIC costs $300 and operates with any CA mini, the company added from 18651 Von Karman, Irvine, Calif. 92713.

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"Did a Dataproducts printer really make this mess?"

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Distinction Between Terminals, Minis Seen Getting Blurrier

By Toni Wiseman
Of the CW Staff

DALLAS – The difference between intelligent terminals and low-end minicomputers is becoming a very gray area – one in which user education may soon be the determining factor, according to terminal manufacturers interviewed at the National Computer Conference here last week.

Terminals based on Intel Corp.'s 8080 are so rudimentary that about all they can do is basic editing, according to John T. Pryke, product marketing manager for Computek, Inc., a wholly owned subsidiary of General Automation, Inc.

What is here now is a processing terminal that borders on a mini; one which can perform several functions, he said.

In a cluster of four identical terminals, for instance, two can operate on-line in an inquiry mode, emulating dumb terminals; the third can be used for off-line key-to-disk data entry; and the fourth may be a completely stand-alone text processing application.

This would be an LSI-type machine, rather than a micro-based one, he added.

The Only Difference

In many cases, the only difference between a mini and an intelligent terminal is in how the terminal is being supplied, since a terminal may very well have a communications interface, support peripherals and even control slave terminals, Pryke explained.

"People are finally beginning to understand how to use intelligent terminals for applications other than text processing," Pryke said.

"This segment of the terminal market is still not efficiently serviced at this time, but a few vendors are approaching it, creating a new high-end to the intelligent market," he stated.

Pryke predicted that more and more functions will be hard-wired into the terminals, such as context switching, direct memory access and transfer and even some forms of multiprocessing.

As the area between minis and these super-intelligent terminals becomes grayer, he projected annual sales will rise for the terminal makers from some $250 million in 1976 to almost double, $475 million, in 1980.

Conflict With Micros

David R. Carson, western regional manager for Perkin Elmer Data Systems' Terminals Division, agreed on a gray area, but he sees the conflict arising with micros not minis, as intelligent terminals are used to offload the host processor.

"Our Owl has 100 chips doing what used to be done by 300 to 400 chips," Carson said. "There are chips in development now that could cut that number down to 25.

"With that ability, the industry will start seeing more functions in intelligent terminals to relieve the host," he said.

Intelligent terminals are cropping up everywhere and for two primary reasons, Carson suggested.

First, the initial investment is relatively

(Continued on Page 59)

Add-Ons Regain Stamina After IBM Price Moves

By Molly Upton
Of the CW Staff

DALLAS – Add-on memory makers at the National Computer Conference indicated business has rebounded after the April IBM price changes on 370 memories and the resultant reduction in business while users evaluated the announcement.

Perhaps as a way to cut costs and keep prices as far below IBM's as possible, firms are trending toward increased interchangeability of memories between different CPUs.

However, there was some disagreement as to how much the independents as a group have cut prices in order to get their sales back on the track after the IBM moves.

Despite the IBM moves, spokesmen for Intel Corp. and Electronic Memories & Magnetics Corp. (EMM) said they expect this year to be better than 1976.

Intel is "quite confident it can achieve its plan for the year unless IBM makes another announcement and the market has another hiatus," according to Kent Mueller, national sales manager for end-user accounts for the firm's Memory Systems Division.

Revenues and volumes have rebounded as scheduled, he added.

The firm is expanding its memory marketing efforts and plans a new product toward the end of the year that will be an "additional product family," he said.

Ed Farris, corporate vice-president of EMM, agreed that 1977 can still be a good year for his firm, unless IBM "does another number."

April and May were awful and there's no way to recover the lost revenue, but June has been better, he said.

There will probably be some fallouts in the add-on memory business, Farris pointed out, since the market is not big enough for all those who have been in it.

Although profit margins are "adequate to manage business," they are down about as low as they can get with current technology, he added.

Getting Back on Track

How have the independents gotten back on the order track?

Mueller said Intel prices have been altered, but not 35% across the board, as were IBM's reductions.

He doubts any independent is selling 50% below IBM, whereas some products, such as those in larger configurations on older machines, were as much as 70% below IBM prices prior to the announcement.

The current price differential between Independents and IBM is more like 30%, he said. The independents' decreases were minor because margins are tighter.

Len. Eschweiler, national account manager for National Semiconductor Corp., commented only that the firm had reacted to IBM's price cuts.

(Continued on Page 59)

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With Software in Hardware

Fresh Market Seen Beyond Programming Barrier

By Nancy French
Of the CW Staff

DALLAS — There is an enormous, unrealized opportunity to provide computing power to individuals outside the mere one million who have programming ability. The way to cross that "programming barrier" is to provide software in the form of hardware — an extension of today's programmable calculator, Mark Shepherd, Jr., chairman and chief executive officer of Texas Instruments, Inc. said at the 1977 National Computer Conference here last week.

The most exciting thing about this untapped market is that "it will allow us to leverage our software brain power the way we multiplied our hardware brain power," Shepherd told a capacity crowd at the Dallas Convention Center.

If it's done right, he said, the mass of users will use solid-state program modules like any other tool. These modules will be so cheap they will be used "as provided without any customization," he predicted in the keynote address.

CW At NCC

Referring to personnel within his own company, Shepherd noted almost every engineer owns a programmable calculator, but few know how to program.

The greatest obstacle to the broader use of computers is communication between man and the computer. In the early days, "people programmed in the machine's language," he said, but today, with Cobol, Fortran and structured programming languages such as Pascal, man is communicating with computers "in a more natural manner."

How does Shepherd propose to cross the programming barrier?

Teaching everyone to program is not the solution, he indicated, nor is inventing the ultimate natural interface.

The answer is bypassing programming by putting more software into hardware — into read-only memory (ROM) that is "tamperproof" and "disasterproof." Today ROMs are being built into a wide variety of terminals and other equipment; in the near future, Shepherd said, libraries of solid-state software functions will be available to users of small systems and small business systems, and they will function as the operating systems for many terminals.

The next step will be the modular assembly of programs at the choice of the user, he said, adding the individual will be able to select modules to do specific jobs.

Despite the problems the industry has

CW Photo by A. Dooley

Mark Shepherd Jr.

confronted in improving semiconductor technology, "we can project the technological capability of building a single-chip, 32-bit microprocessor with one million bits of memory in the 1980s," Shepherd said.

The semiconductor industry has entered an era where the entire systems functions of an end product can be accomplished by a few semiconductor chips or one chip with enough versatility to permit adaptation to many different applications, he said.

Semi's Implications

This has enormous implications, he pointed out. Lead time for systems implementation will be shortened because no specific chip development will be required, thus cutting development costs as well.

The cost per "active element group," which Shepherd defined as a measurement equal to logic gates and memory cells of transistor transistor logic (TTL), has been reduced by a factor of 60 in the past 10 years while assembled TTL has been reduced by a factor of 15, he noted.

The cost reductions in computer memory were accelerated by the emergence of the semiconductor solution in the early '70s, he said. Dynamic random-access memories have come down in price from 3 cents per bit in 1972 to 1 cent per bit in 1977, he said, predicting that in the next decade they will be reduced by another factor of 10.

ROMs are also less costly. By 1985, components for a 1M-byte memory will cost less than $2,000, he forecast.

Secondary memory has also dropped, he said, adding that many new storage technologies are emerging, including magnetic bubbles, lasers and holography.

In the early '60s, the functional equivalent of a medium-scale computer cost $30,000. Today's cost equivalent has dropped to $9,000 and by 1985 it will drop to less than $100, he forecast, thus "penetrating the personal cost threshold."

As this is accomplished, greater challenges will be encountered in cost of sales, service and maintenance, Shepherd noted. He urged vendors to incorporate self-diagnosis and self-repair in tomorrow's systems; this more than anything else will serve to distribute computers to the point of need and keep costs down, he said.

Programmable calculators are emerging where communications or distributed access to a data base is not needed, he said, and the calculator has accomplished something the computer never did — it brought computers to individuals at their desks and in their homes.

The best key-to-disk system isn't the best known...

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Characteristics of Terminals, Minis Seen Blending

(Continued from Page 57)

small even compared to minis.

Second, the level of computer experience required is relatively small because today a user can buy an intelligent terminal programmed in a high-level language such as Basic, which everyone can learn, he stated.

Two years ago, chip microcode was still used as a language for these terminals, he noted.

"The problem is the vendor," Carson said. "He has got to decide who to sell to and what level of support he is willing to provide.

"The buyer would like to think he doesn't need any support and vendors, in some cases, would like to ignore it too. And that's okay for a single terminal buyer.

"But the large networks of terminals that big companies are installing, often with hundreds of terminals, need a different level of support," he said.

Carson suggested that intelligent terminals may well displace minis for the single-terminal buyer because of the cost factor.

However, major users will continue to use networks with hosts because terminals simply cannot offer all the capabilities for communications and keeping track of dispersed files, he explained.

Some kind of a computer will still be needed as a front end, "but this will make the mini more efficient in that it becomes a communications and file manager," he added.

Carson said that the chosen market of the vendor will dictate what features he puts into firmware or microcode. "With microcode you face the same problem as with minis and mainframes — you run out of space and it becomes a cost trade-off.

"No one will ever have everything everyone wants in one terminal; it simply isn't cost-effective," he stated, noting IBM tends not to be cost-effective sometimes because the user doesn't need all the features offered by a system.

While Hazeltine Corp. doesn't currently market an intelligent terminal, it is an area the firm is seriously looking at, according to Rick Rose, southern regional manager.

One thing the company has determined is that "intelligent terminals cannot exist without a field maintenance force and software support. That's why companies like Datapoint exist; they have to be willing to make the commitment," he stated.

Hazeltine has also not decided whether it would offer an intelligent terminal for a specific industry or a general-purpose machine, Rose said, adding dumb terminals may still be the way to go since IBM is using dumb terminals communicating through a centralized system.

In any case, the market for super-editing terminals is deteriorating, Rose stated. In the future, it will either be a dumb terminal or a super-intelligent one.

Carl Rasmussen, director of marketing for Beehive International, concurred that intelligent terminals are going to expand more than ever before into end-user markets and distributed DP.

"I don't think they will ever totally replace minis, but they will certainly fill the gap between editing terminals, as they are known today, and the higher powered 16-bit word minis," he said.

Rasmussen predicted more integrated packaging of all products rather than separate CRTs, CPUs and floppy disks, for instance. There will also be more firmware for local functions needed to bring up the overall system, as well as higher level languages.

A user would buy a mini today rather than an intelligent terminal because of the mini's potential expandability, he said.

But two to three years out, there will be a gray area in which terminals will begin to compete, he predicted, noting the Beehive B800 can be configured with 10M bytes of disk, 32K of memory, a 300 line/min printer and six slave terminals!

Megadata Corp.'s president, Robert R. Richards, agreed the clear line is disappearing as a result of software.

"The customer now has the ability to define his own ground rules. He is in control of the applications, not the manufacturer. And with software, he is now able to integrate several functions into the same terminal, such as inventory control, word processing and communications," he said.

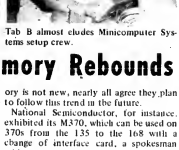
Strength in Software

"Hardware is meaningless today," Richards stated. "Everyone has the same hardware. It would be difficult to find an advantage or disadvantage from vendor to vendor. A terminal manufacturer's strength is in his software."

Intelligent terminals' impact on the mini market will only come about through education of the marketplace, he said. Users have to be shown that a clustered system can be more cost-effective than a mini.

Users, he suggested, are simply not aware of the power available from intelligent terminals, and mini manufacturers are trying to keep it that way. But the fact remains that many intelligent terminals are computers that appear to look like video terminals.

"I thought you were bringing GE's company backgammon set."



Tab B almost eludes Minicomputer Systems setup crew.

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Independent Memory Rebounds

(Continued from Page 57)

Len Kilfoyle, director of marketing for EMM's Systems Equipment Division, said independents are probably trying to keep their relative margins below IBM prices.

Whereas IBM memory previously cost $170,000 per M-byte compared with independents' $100,000 per M-byte, the IBM price is now down to $110,000 per M-byte and the independents' prices will probably be around $70,000 per M-byte, Kilfoyle said.

Plan to Follow Trend

While some vendors maintain the concept of interchangeable or universal memory is not new, nearly all agree they plan to follow this trend in the future.

National Semiconductor, for instance, exhibited its M370, which can be used on 370s from the 135 to the 168 with a change of interface card, a spokesman said.

However, National Semi is still selling 158 and 168 memories because it does not have the interfaces for these systems yet, according to Eschweiler.

Others noted they have memories interchangeable within a couple of systems, such as the 135 and 145, or have been using the same core cards in a variety of 360 systems.

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- How to develop an effective "win strategy," mobilize the proposal team and control the input of the various team members
- How to organize the proposal contents—what goes where in the management, technical and cost sections
- How to develop task descriptions, manpower estimates and a work breakdown analysis

Copies are available pre-paid only from Mercury Communications, Inc. 730-CW Mission, Santa Cruz, CA 95060. $55 includes 3-5 day deliv. inside USA. In Calif. + $3.12 tax

UK Seeking Wider Market

MANCHESTER, England — The National Computing Centre is initiating a project designed to stimulate the demand for British software products and services from overseas.

"We believe the potential for the export of British skills in programming, software products and services is very considerable," David Firnberg, the center's director, said. "While UK costs are relatively low by world standards, it is a good moment to launch what will be a high-quality service for which we feel there will be a continuing demand."

The first move in the plan is the preparation of a control manual for use by UK software and systems houses when contracting to do "off-shore" or remote programming — programming in the UK from foreign specifications.

Further information is available from D. Walker, National Computing Centre, Oxford Road, Manchester M1 7ED, England.

European Mart Unchanged After Furor

By Toni Wiseman
Of the CW Staff

LONDON — While 1975 and 1976 saw a great flurry of activity in the European computer industry, there was essentially little change in the general-purpose mainframe sector after the furor died down, according to *EDP/Europa Report* (EDP/ER).

The newsletter estimated that in those two years, the number of mainframes increased by 8% per year, while corresponding installed values increased by 7% annually. The mainframe increases ranged, by number, from 4% in Italy to 9% in Germany and, by value, from 2% in Italy to 10% in the UK, it noted.

"The period has been a difficult one for the mainframe market.

International News

We have had recessions and inflation at national levels, the sector has suffered encroachments at the bottom end from the [small business system] and mini makers, with a resultant lowering of hardware prices and the introduction of new models at the bottom end," EDP/ER observed.

It was also a period that saw "the virtual eclipse of models, already obsolescent in 1974, which had a high value at installation and which had tended to be carried forward in estimating installed values," it added.

In its examination of the market, EDP/ER found two noteworthy facts.

First, by 1974 the majority of second-generation machines had disappeared; the few that were left by the end of 1976 were in special situations such as minor colleges, where they represent a very minor replacement opportunity for mainframers but a major one for minicomputer manufacturers.

Secondly, during the period 1974-1976 a considerable number of early and mid-third-generation machines disappeared. In some cases this resulted from massive field upgrades; in others, a replacement model from the same manufacturer was installed.

There were also some competitive gains and losses, the report noted.

"An additional factor has been the growth in systems in which the CPU power of several smaller machines has been concentrated into a single centralized system, even though the sites remained in use — that is to say, a form of distributed data processing has taken place," EDP/ER stated.

IBM on Top

IBM continues to claim the lion's share of the European market, a 56.4% share by number and a 54.5% share by value, according to EDP/ER figures.

Honeywell has the next largest slice of the market, 12.9% by number and 10% by value.

International Computers Ltd. (ICL) can claim 8.9% by number and 7.6% by value, while NCR has 6.6% by number but only 2.8% by value. Univac, on the other hand, has only a 5.3% share of the market by number, but an 8.4% value share, it said.

Both Honeywell and ICL have gained extra bases by the acquisition of CII and Singer respectively. "However, these do not appear to have caused the bulge we expected to see in value or number," the report stated.

"Similar factors appear to have operated in each case, withdrawals and replacements of older machines — in the case of Honeywell the constant cry was 'where have all the Gammas gone?' — and a low unit value for the acquired base," it said.

UK Value Higher

In a country-by-country analysis, EDP/ER found the UK had a higher than average increase in value, largely because of inflation. ICL lost its position as market leader to IBM, but that could well be a short-term situation, the newsletter suggested.

"We believe the situation in France has, in terms of numbers, been relatively static, but that there has been considerable replacement activity, especially at the bottom end," it said.

Germany remains the market leader both in terms of numbers and value of installed systems. "Siemens has obviously significantly increased its installed base over the last two years and now rates well above both Honeywell and Univac.

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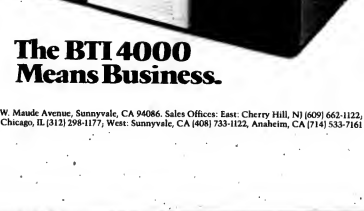

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Executive Corner

Kroger Heads Univac Marketing

BLUE BELL, Penn. — Joseph J. Kroger has been named executive vice-president of worldwide marketing and services for Univac.

Kroger, who most recently was vice-president and general manager of the company's Americas Division, will report to Gerald C. Probst, president, and have responsibility for both international and domestic marketing activities.

Kroger succeeds Harry A. Steinberg (57), who has chosen to retire to pursae personal interests. Pending his retirement, July 31, Steinberg has been appointed vice-president and special assistant to the president.

Commenting on Kroger's new appointment, Probst stated that "ander his leadership the Americas Division increased compater bookings in fiscal year 1977 to a record $600 million. He has heen an integral part of oar concerted and saccessful effort in recent years to expand the scope and effectiveness of our marketing operations."

Kroger joined Univac in 1960. From 1965 to 1970 he held branch manager positions in Memphis, Minneapolis and Chicago.

In 1971 Kroger was named vice-president of central operations in the Americas Division. He was promoted to vice-president and general manager of the Americas Division in 1972.

The Americas Division serves the continental U.S., Canada, Mexico, Argentina, Australia, Brazil and Paerto Rico and Latin American distribator operations.

Other Moves

- John P. Lau has been promoted to president of Creative Socio-Medics Corp.
- Dr. John L. McLucas has heen elected president of Comsat General Corp. and to the board of directors. John A. Johnson was also elected to the board.
- Joseph L. Scheaer has been appointed president of Systems Resources Corp.
- Frederick Walzer has heen appointed president of the DaMont Division of DuMont Electronics Corp., a Thomson-CSF company.
- William B. Patton has joined MSI Data Corp. as vice-presideht of marketing.
- R.A. Bishop has been appointed assistant vice-president, international marketing, for Incoterm Corp.
- John (Jack) Berrigan has heen appointed vice-president and general manager of PHD Systems for Computing, Inc.
- Montie Parker has heen named vice-president of financial planning and administration for the Lease Administration Division of Itel Corp
- Peter S. Jonas was elected vice-president and controller of General Automation, Inc.
- Joseph M. Rasche has been appointed divisional vice-president of sales, hanking and commercial systems by the Information Systems Division of Bunker Ramo Corp.
- Vernon Z. Smith has joined Microdata Corp. as senior vice-president.
- Jack Fielder and George Enochs have heen appointed executive vice-presidents of the Banking Services Division of Banking Systems, Inc.
- Victor O. Muth has been named president and George E. Comstock has been appointed vice-president of the Information Products Group of Diablo Systems, Inc
- John G. Hill has been appointed vice-president of sales for Storage Technology Corp.
- Rune Nyman has been named vice-president and general manager of the Univac Office Equipment Division for the Europe Asia Africa Division.
- Brian L. Swancutt has been named vice-president, hyhrid microelectronics, in the Electronics Devices Division of Rockwell International's Electronics Operations.
- Chris A. Christopher has been appointed to the new position of vice-president of financial systems for Univac.
- Richard J. Egan has rejoined Cambridge Memories, Inc. as executive vice-president.

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Growing Through Acquisitions

Pertec End-User Orientation Deliberate

By Toni Wiseman
Of the CW Staff

BOSTON — Pertec Compater Corp.'s emergence as an end-aser company is not the result of an opportanistic acquisition, bat a well-planned evolation of the corporation, Ryal Poppa, chairman and president, told stockbrokers here recently.

From its beginnings in the design, manufacturing and marketing of OEM peripherals, Pertec has grown into a major peripherals company, with annual sales in excess of $40 million for tape transports, disk drives, flexihle disk drives and, with the recent acqoisition of Icom, miniperipheral controllers, Poppa said.

The Pertec Division, during the past fiscal year, not only exceeded its revenae and profit projections but significantly improved its market share in both tape and disk drives, he noted.

"Although standard industry research reports indicate the tape transport market served by Pertec, is growing at 3% annaally, Pertec's growth in tape revenae is averaging 15% per year.

"The same reports indicate an overall industry growth rate for disk drives at 30% per year; Pertec is averaging a growth rate in excess of 50% per year for disk drives," he said.

After the acquisition of Icom, manufacturing and marketing responsibility for flexible disk drives was transferred to that division.

Floppies Weaker

"We have not heen as successful in floppy disk drives as we have heen in rigid disks and tapes," Poppa observed. "Shugart has far and away taken and held the floppy disk basiness — to the point that all of the others in the business have not really achieved their original share of market projections.

"But Pertec has shown a steady growth in market share, alheit small," he said, adding the firm expects a hetter return on investment with the Icom acquisition.

Strong OEM

Pertec feels its position as an OEM is a strong one. "IBM compatihility is often considered to he a de facto design standard hy the competitors of IBM in order for them to saccessfally compete with IBM," Poppa said.

"Well, every competing manufacturer of tape transports has designed drives that are Pertec-compatible," he pointed oat.

To he saccessful in the OEM basiness, Poppa indicated five strengths are needed.

- A quality product, produced in volume.
- Attractively priced products with low manufacturing costs.
- A high degree of manafacturing support.
- A high degree of reliability.
- An ability to lead or match the market.

The same requirements are necessary for a sucessful end-user husiness — bat, he noted, with four major additions.

- A strong software development capability.
- A strong field sales and sapport organization.
- A strong field service organization.
- Financing to support the lease hase.

"Consequently, the aspects of hoth hasinesses are not that dissimilar and indeed, with the proper planning, financially they blend rather nicely.

"The OEM business and the end-user basiness will grow independently and profitably," he said.

Cushion Effect

"Cash generated by the OEM segment can be ased in part to support the end-aser portion. The fact that they will he approximately equal in their contribution to the corporation means that they will tend to smooth oat each other's cash demands and provide the corporation with a cushion against the unbalancing effect of the economic swings throughout the world," he said.

While key-to-disk systems, the traditional CMC product line and the Business Systems Division private-label prodact are expected to decline in annual shipments after this year for all manufactarers, Pertec has already introduced its enhancement offering to this market, Poppa indicated.

"The traditional key-punch replacement market is shifting to a processing-oriented market, especially in remote environments," he stated.

Pertec is an acqaisition-minded company, Poppa observed, citing the recent acquisition of Icom and of Mits, Inc.

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The minimum acceptable qualifications are a master's degree with a major in computer science or related field. Three years of administrative experience in a minimum required may be substituted for the master's degree and five years of experience in data processing of which at least two years must have been in a supervisory or administrative capacity.

Application deadline is July 1, 1977. Send application to Dr. William S. Orr, Associate Dean, College of Education, Marshall University, Huntington, West Virginia 25701.

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SENIOR SOFTWARE SPECIALISTS

Several positions are currently available which will consist of the development of very large distributive processing systems and will include advanced state-of-the-art technology. Will utilize the entire spectrum of EDP equipment from mini's to large main frame and a large assortment of associated peripherals and other devices, i.e. terminals, etc. Minimum of 8 years' experience in the development of systems software with the preponderance of this experience in telecommunications, networks and file processing, plus a background in operating systems. Expertise in COBOL and assembly languages necessary with strong preference for a related degree.

NCR, Special Systems Division, is a small division located in modern Sorrento Valley Industrial Park (suburban San Diego). We are a systems development organization involved with complex EDP and a new high technology systems.

Employees will enjoy excellent sa lary and top working conditions with a commercial employer. Fully paid life, hospital and medical plan for employees and dependents. Generous relocation allowance.

If you are interested in being considered for one of several new positions with us, please send your resume and salary history/requirements to Thom Harris.

NCR Special Systems Division
4045 Sorrento Valley Blvd.
San Diego, Calif. 92121

An Equal Opportunity Employer

PROGRAMMER ANALYST

SUNY/EMPIRE STATE COLLEGE is seeking a PROGRAMMER/ANALYST to design educational administrative systems with programming responsibilities under the direction of the Director, Computer Services. Candidates must possess the following qualifications:

- **Applications programming experience using CICS/COBOL**
- **Debugging 360/370 Assembler Programs and coding in ALC**
- **OS/JCL coding experience preferred, knowledge of CDS/JCL coding experience acceptable**
- **At least five years progressive experience in data processing as a programmer/analyst, or equivalent experience**
- **BA/BS degree, or AA/AAS degree in data processing, or the equivalent.**

Salary: $12,700-16,800 depending on background and experience. Interested persons must send letter of application and resume to Mr. Ralph E. Zimmer, Affirmative Action Officer, SUNY/ESC, 2 Union Avenue, Saratoga Springs, NY 12866. An equal opportunity/affirmative action employer.

PROG./ANALYST
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Excellent growth potential w/rapidly expanding mfg. co. Better high visibility jobs opportunities for experienced international travelers. Requires min 3 yrs ex prog./analyst w/ in-depth knowl business systems. Knowl mktg/sales apps on PDP-11 a definite plus. Successful applicant will have solid technical skills plus ability to work effectively w/ user mgmt. Salary to $24,000 (Fee Paid) Contact Bill Grady.

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(617) 423-6440

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($32,800-$40,020)

San Diego Police Department Automated Regional Justice Information System Grant is seeking a Technical Director, 1 year contract renewable based on performance. 42 month grant (B.A. degree in Business Administration or equiv) in Data Processing, Police Science or Related. Must know Data Base and IMS. Extensive experience in Telecommunications and Networking within last 3 years. Resume to Chief D.E. Kennedy, P.O. Box 1833, San Diego, CA 92112 by June 30, 1977.

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Will be responsible for maintenance of all operating system software & providing technological guidance to the MIS staff concerning the operation of a Honeywell computer system in a multi-programming environment utilizing data communications & on-line processing.

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CSC
Data Processing Professionals GERMANY

Computer Sciences International Deutschland, GmbH, is a subsidiary of Computer Sciences Corporation of El Segundo, California, the world's leading independent consulting firm in the information sciences industry. Headquartered in Munich, the company offers the range of CSC's services throughout the Federal Republic of Germany.

The continuing growth of business has created the need for additional permanent staff both immediate project requirements and for anticipated expansion. The positions to be filled are for mature professionals with a good knowledge of the German language, who can be effective dealing directly with customer's management and their personnel.

We are seeking individuals with a minimum of 5 years' software development/engineering experience in one of the following areas:

- **Large-scale operating systems**
- **Computer network systems**
- **On-line transaction systems**
- **Data base processing applications**

Offers of employment will be for long-term assignments (minimum of 2 years) and will include relocation assistance, 5 weeks annual paid vacation and an excellent German national fringe benefit package.

Responses, which will be treated in confidence, should include a complete summary of education and work experience; family status (number and ages of children); foreign language abilities; present earnings and date of availability. Interviews will be conducted during July and August.

R.M. Davidson
Director, International Personnel

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To direct and administer programming and systems project teams in development and implementation of the integrated logistics management systems. Must have a minimum of two to eight years experience in all phases of data processing plus demonstrated supervisory experience in Honeywell 6000 series hardware environment. Advanced degree and prior overseas experience desirable.

PROGRAMMER ANALYSTS

Three to five years COBOL programming experience to include materials/maintenance management applications. Background utilizing TDS/TSS and Honeywell 6000 series mainframe required.

IDS PROGRAMMERS

Should possess one to three years experience in Data Base maintenance programming utilizing IDS. Applicants with strong experience in IMS or DMS may be considered.

SOFTWARE ANALYSTS

Prior background in Honeywell software support. Requires thorough knowledge of GCOS, CMAP and CRTS.

COMPUTER OPERATORS

Must have at least two years operators experience on H6000 hardware.

TELEPROCESSING SPECIALISTS

Requires two years in teleprocessing activities utilizing H316/716 hardware with general knowledge of GECOS and working knowledge of TDS, GRTS, TSS, and NPS.

For immediate attention, please send resume to:

Bell Helicopter International
1901 Central Drive, Bedford, TX 76021

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Systems Analyses

This activity centers around analyzing and assessing the capabilities of military command and control systems, including performing operations research work.

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Note: All personal resume responses will be acknowledged within ten working days.

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Requires an individual with technical and management skills to manage a growing 370/158 and 370/145 installation currently running OS/VS2 HASP, IMS, CICS and RJE. Responsibilities include Data Entry, Production Control, Distribution, Recovery and Computer Operations.

Background should include 8-15 years data processing experience with a minimum of five years progressively responsible Operations Management experience in a large OS/On-line environment. Should have working knowledge of hardware, software and JCL. Must have demonstrated skills in planning, scheduling and quantitative techniques. Degree in Math, Engineering, Computer Science, however other experience or degree could be acceptable.

Must also possess the interpersonal skills to deal effectively with all levels of Corporate Management. This position affords very high visibility and excellent long term growth potential for the right individual. Please send resumes including salary history and requirements in confidence to:

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EOE M/F

position announcements

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Large Baltimore industrial seeks software engineer with technical background in data base design and/or distributed network design. $29K range. This is one of 5 major openings for strong data base experience from mid twenties to mid thirties in the Maryland area. (Large Burroughs, Honeywell or IBM exp. a must) Call Pat Southerland in strictest confidence.

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- Experience with DEC PDP 11/35 or higher level computers required.
- Requires a background in minicomputer or microprocessor systems and/or associated application programming.

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- Requires experience in general purpose applications minicomputer programming of peripheral devices, at the assembler level.
- Responsibilities will include the definition and supervision of coding of applications oriented F/W to interface POS terminal peripherals to the base ECR.

COMMUNICATIONS F/W PROGRAMMER

- Requires experience in data communications minicomputer programming at the assembler level.
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DIAGNOSTIC ENGINEER/ PROGRAMMER

- Requires an engineer or hardware-minded programmer with minicomputer programming experience and a flair for the challenge of diagnostic test software.

ALL POSITIONS REQUIRE A BS IN EE, CS, MATH OR RELATED DISCIPLINE.

In addition to an unparalleled career opportunity within NCR, our Millsboro location offers comfortable living in a scenic and uncongested coastal area. The finest marine recreational areas, wildlife preserves, and beaches are within minutes of our Millsboro facility.

Mr. Ron Tull, Dept. CW-620
Terminal Systems Divsion-Millsboro
NCR Corporation
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Dept. of Economics, Room
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Stony Brook, New York 11794
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SYSTEMS & PROGRAMMING MANAGER

Our client, a San Francisco based firm, seeks a top-notch individual to assume responsibility for their systems development group. To qualify, your background must include experience in a large scale IBM OS/IMS/COBOL environment and the management of at least 20 analysts/programmers.

The position offers a starting salary of up to $34,000 plus excellent potential for advancement. Relocation expenses will be paid. Please reply in confidence to Hal Hoffman.

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Our client, one of New England's fastest growing retail organizations is expanding in all areas of its EDP staff. This has created openings for:

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SENIOR PROGRAMMERS
SYSTEMS PROGRAMMERS

If you have experience in the development or programming of retail systems, or a strong financial systems or programming background, this is the opportunity to join a successful organization on the move.

Excellent compensation and a complete benefits package are offered. All positions are located in suburban Central New England within easy driving distance to the mountains, the seashore or Boston.

If you are interested in further details or desire an immediate interview, please contact:

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DATA PROCESSING PLACEMENT
DUNHILL OF WORCESTER, INC.
(617) 798-0116

Client companies assume all fees, interview and relocation expenses.

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SR. PROGRAMMER ANALYSTS

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Hartford, Conn. 08103
(203) 278-7170

SENIOR INFORMATION ANALYST

The University of Georgia is seeking an experienced data processing professional to work in the design and implementation of administrative financial computer-based information systems. Experience must include computer-based information systems design, data base management systems, large scale computing systems, and software development project management. Familiarity with dual IBM 370/158 MVS, IMS and TSO environments are desirable. A master's degree is desirable; a bachelor's degree is required.

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Detroit, Michigan 48202

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Miami, Florida 33169

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Minneapolis, Minnesota 55402

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P.O. Box 8000
Greensboro, N. Carolina 27405

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Wallingford, Pa. 19086

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Electronic Systems Personnel
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Pittsburgh, Pennsylvania 15219

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San Francisco, California 94111

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CFA Associates Personnel, Inc (Agency)
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Syracuse, New York 13206

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Data Processing Careers, Inc
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Tulsa, Oklahoma 74114

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position announcements

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Openings in our Santa Clara & Irvine offices. Responsible for major account support, marketing situations, customer presentations, demos, proposal writing, presentations. Requires experience in project implementation, heavy programming (2+ languages), applications (2+ industries). Must be an effective communicator. Time-sharing, data base (CICS, IMS, DL/I) experience and BA or BS desirable.

Salaries are commensurate with experience and ability, and OSI provides an excellent employee benefits program. If the pursuit of excellence is the challenge you are seeking, we invite you to join our team. Please contact the Department, 2775 Northwestern Parkway, Santa Clara, California 95051. (408) 247-4444. Please, no agency referrals.

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The position requires a minimum of 3 years operating systems development experience.

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T.V. Lotzer
Personnel Manager
Cray Research, Inc.
7450 Metro Parkway, Suite 205
Minneapolis, Minn. 55420

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position announcements

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The System Sciences Division of Computer Sciences Corporation is continuing its expansion by creating additional career growth positions for qualified computer professionals in support of two major projects.

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System generation and maintenance on OS/360 – 6-8 years experience. 360 systems generation and operating system maintenance experience required; ALC essential.

Design and implementation of a real-time data base management system – 6-8 years experience, ALC or Jovial preferred, design, implementation or enhancement of data management or data base management systems.

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- Telemetry application with multi-computer configuration
- Integration and testing of real-time display software
- Data base management
- Real-time scientific applications
- Network management
- Computer-to-computer communications
- System requirements definition
- Analysis and application of climatological data
- Geometric and wave optics, lens system design and analysis, and optical system modeling

CSC offers a liberal relocation policy in addition to complete benefits package. For immediate attention, please send resume or call:

Staffing Department
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position announcements

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School of Business Administration

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Instructor for one-year appointment beginning Fall, 1977. Master's degree in Computer Science, Management Information Systems or related field is required and teaching and/or industry experience is desirable. Salary range for the nine-month academic year is $13,000-$14,000.

CLOSING DATE FOR RECEIVING COMPLETED APPLICATIONS FOR ABOVE POSITIONS, INCLUDING RESUMES, COPIES OF TRANSCRIPTS AND LIST OF REFERENCES IS JUNE 30, 1977. Contact Dean R.N. Adamchak, School of Business Administration, Pan American University, Edinburg, Texas 78539.

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SOFTWARE SYSTEMS ANALYST
SYSTEMS ANALYST
SYSTEMS PROGRAMMER

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Call or send resume to:
Data Processing Dept.
PERSONNEL PLACEMENT
5370 Huffman Mill Rd.
Burlington, N.C. 27215
(919) 584-3581

Manager of Network Academic Services

The Regional Computer Center at the University of Iowa is accepting applications for the position of Manager of Academic Services.

Duties include the coordination and promotion of instructional and research computing at network schools through activities which include workshops, scholarships, implementation of computer-based instructional materials, and newsletter articles.

A Master's degree or its equivalent in combination of education and experience is necessary. Programming experience is necessary. Teaching experience at the college level is desirable.

Send resumes with salary history and three references to Chuck Shomper, Recruiting Coordinator, Computer Center, 128 Lindquist Center, University of Iowa, Iowa City, Iowa 52242.

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SYSTEMS PROGRAMMERS

Marathon Oil Company has opportunities for Systems Programmers who have experience on large scale IBM 370 Systems.

We are seeking candidates:

- Who have experience in HASP, OS/MVT, VS2R1.7 (SVS), VS2R2, or any combination.
- Who are seeking high visibility in a performance-oriented environment.

Interested? Pick up the phone NOW and call: John J. Schwepe, Manager, Operations Software Department. Please call collect 419/422-2121, Ext. 2951. It will take just a few minutes of your time. (We will accept calls weekdays from 8:00 a.m. to 4:00 p.m. EST.)

These positions are located in Marathon's General Offices in Findlay, Ohio, and offer a salary commensurate with education and experience and a complete benefits package. Principals only, no agencies.

Marathon Oil Company

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DIRECTOR

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Initially, the Director will be heavily involved in MRP development, equipment selection and software evaluation within the framework of $25-35 Million operating divisions.

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Reply in confidence to:
Walter Meyer

ROMAC
& ASSOCIATES (Personnel Consultants)
P.O. Box 67, Orchard Park, New York 14127
Telephone: (716) 853-6203

CSC
REGIONAL REPRESENTATIVE

THE COMPANY:

Computer Sciences Corporation, a leader in the field of information sciences with over 8000 employees, provides the nation's government and business communities with remote computing services through its Information Network (INFONET) Division. The acceptance of these services has been highlighted by an achievement of substantial profitability and continuous growth.

THE OPPORTUNITY:

Continuing expansion of the services we provide to the federal government has created an exceptional opportunity for a proven support specialist representative within our Midwest district. The professional we seek will have a minimum of 3 years proven experience in the communications industry with a solid background in teleprocessing and large scale operating systems programming. The selected individual will be the key in our support to government programs in the Midwest. He or she should possess a strong marketing/service relations orientation and be willing to travel within the district.

THE REWARDS:

We offer a stimulating environment, substantial salary plus incentive earnings, a comprehensive benefit program, and the prestige of representing the world's leader in the field of information sciences. For immediate consideration, please send your resume in complete confidence to:

William Walraven

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590 Fifth Avenue
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Oak Brook, Illinois 60521

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Mr. Wayne Klassen
Manager, Employment

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UNIVERSITY
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DATA PROCESSING MANAGER

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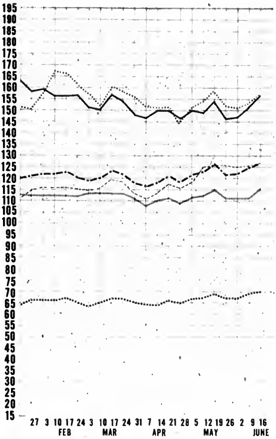

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	1977	1976
Shr Ernd	$ 33	$ 25
Revenue	18,400,000	16,700,000
Earnings	1,900,000	1,500,000
6 Mo Shr	52	61
Revenue	35,500,000	33,300,000
Earnings	3,700,000	3,000,000

ECAN-DATA
Three Months Ended March 31

	1977	1976
Shr Ernd	$.18	$.01
Revenue	4,282,640	3,287,408
Tax Cred	148,960	3,600
Earnings	323,571	18,528

STORAGE TECHNOLOGY
Three Months Ended April 1

	1977	1976
Shr Ernd	$ 37	$ 29
Revenue	19,458,000	18,682,000
Earnings	1,649,000	1,406,000

TECHNALYSIS
Three Months Ended March 31

	1977	1976
Shr Ernd	$ 12	$ 05
Revenue	690,587	476,815
Earnings	46,000	28,736

TECHNICON
Three Months Ended April 1

	1977	1976
Shr Ernd	$ 25	$ 22
Revenue	66,465,000	53,287,000
Earnings	5,502,000	4,774,000

TEKTRONIX
Four Months Ended March 5

	1977	1976
Shr Ernd	$1 43	$1 06
Revenue	140,100,000	113,646,000
Earnings	12,656,000	9,502,000

TELEX
Year Ended March 31

	1977	a1976
Shr Ernd	$ 56	$ 53
Revenue	119,272,000	106,243,000
Tax Cred	3,303,000	2,496,000
Earnings	6,285,000	5,623,000

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TRADE*QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, JUNE 15, 1977

All statistics compiled, computed and formatted by TRADE*QUOTES, INC. Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		1977 RANGE (1)	CLOSE JUN 15 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	AMDAHL CORP	0- 39	23	-1	-4.1
N	BURROUGHS CORP	55- 91	60 5/8	+2 1/4	+3.8
O	COMPUTER AUTOMATION	18- 28	27 3/4	+1 1/4	+4.7
N	CONTROL DATA CORP	20- 26	21 3/4	+ 7/8	+4.1
N	DATA GENERAL CORP	35- 46	42 7/8	+ 1/2	+1.1
N	DATAPOINT CORP	18- 30	25 3/4	+4 3/4	+22.6
N	DIGITAL EQUIPMENT	37- 53	45	+1 5/8	+3.7
N	ELECTRONIC ASSOC.	2- 3	1 7/8	+ 1/8	+7.1
A	ELECTRONIC ENGINEER.	8- 10	8 1/4	+ 1/4	+3.1
O	FOUR-PHASE SYSTEMS	13- 17	14 1/2	+1 1/8	+8.4
N	FOXBORO	42- 54	51 1/8	+ 7/8	+1.7
O	GENERAL AUTOMATION	6- 9	6	+ 1/8	+2.1
C	GPI COMPUTER CORP	1- 1	3/4	0	0.0
N	HEWLETT-PACKARD CO	69- 87	79 7/8	+2 3/8	+3.0
N	HONEYWELL INC	44- 53	52 3/8	+ 3/8	+0.7
N	IBM	245-286	258 3/4	+5 7/8	+2.3
C	MANAGEMENT ASSIST	5- 9	5 1/4	+ 1/8	+2.4
O	MEMOREX	23- 29	23 1/2	- 1/8	-0.5
O	MICRODATA CORP	7- 18	10	+ 1/4	+2.5
C	MODULAR COMPUTER SYS	5- 8	P	+ 3/4	+10.3
N	NCR	32- 38	36 3/8	+1	+2.8
O	PRIME COMPUTER INC	12- 17	16 1/8	+1	+6.6
N	PERKIN-ELMER	17- 21	18 5/8	+ 3/8	+2.0
N	RAYTHEON CO	55- 66	65 1/2	+ 3/4	+1.1
N	SPERRY RAND	34- 42	36 5/8	+2	+5.7
O	SYCOR INC	8- 15	8	- 1/4	-3.0
A	SYSTEMS ENG. LABS	5- 7	6 1/8	+ 1/8	+2.0
N	VARIAN ASSOCIATES	15- 21	20 1/2	+ 5/8	+3.1
A	WANG LABS.	14- 18	14 7/8	- 1/8	-0.8

LEASING COMPANIES

EXCH		1977 RANGE (1)	CLOSE JUN 15 1977	WEEK NET CHNGE	WEEK PCT CHNGE
C	BOOTHE COURIER CORP	8- 10	8 5/8	- 1/8	-1.4
O	COMDISCO INC	10- 13	9 3/4	0	0.0
A	COMMERCE GROUP CORP	2- 2	2 3/8	+ 3/8	+18.7
A	COMPUTER INVSTRS GRP	1- 2	7/8	0	0.0
M	DATRONIC RENTAL	1- 2	1	0	0.0
A	DCL INC	1- 2	1 3/4	0	0.0
N	DPF INC	6- 8	7 1/4	+ 1/2	+7.4
N	ITEL	13- 17	16 7/8	+1 1/8	+7.1
N	LEASCO CORP	19- 24	20 5/8	- 1/4	-1.1
O	LEASPAC CORP	1- 1	5/8	0	0.0
C	NRG INC	0- 0	1/8	0	0.0
A	PIONEER TEX CORP	6- 11	6 1/8	- 1/4	-3.9
N	U.S. LEASING	10- 13	13 3/8	+1 1/8	+9.1

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH; L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID.
(1) TO NEAREST DOLLAR

SOFTWARE & EDP SERVICES

EXCH		1977 RANGE (1)	CLOSE JUN 15 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 2	1 3/8	0	0.0
O	ANACOMP INC	7- 9	8 1/2	- 3/8	-4.2
A	APPLIED DATA RES.	5- 9	8 7/8	+ 5/8	+7.5
N	AUTOMATIC DATA PROC	23- 30	28 3/4	+1 3/4	+6.4
O	COLEMAN AMERICAN COS	2- 2	1 7/8	+ 1/8	+7.1
O	COMPU-SERV NETWORK	10- 15	12 1/2	+ 1/2	+4.1
C	COMP ELECTION SYSTMS	6- 9	8 3/4	+ 1/8	+1.4
O	COMPUTER HORIZONS	1- 1	1 1/4	0	0.0
C	COMPUTER NETWORK	6- 7	5 3/4	- 3/8	-6.1
N	COMPUTER SCIENCES	7- 9	7 1/2	0	0.0
O	COMPUTER TASK GROUP	1- 2	2	0	0.0
O	COMPUTER USAGE	2- 3	1 5/8	- 1/8	-7.1
O	COMSHARE	5- 7	5	- 1/4	-4.7
O	DATA DIMENSIONS INC	4- 5	3 3/4	- 1/8	-3.2
O	DATATAB	1- 2	2	+ 1/8	+6.6
N	ELECTRONIC DATA SYS.	16- 19	18 3/8	+1 1/4	+7.2
C	INSYTE CORP	2- 3	1 5/8	- 1/8	-7.1
O	IRS COMPUTER MARKET.	1- 2	1 1/2	0	0.0
O	KEANE ASSOCIATES	3- 4	4	+ 5/8	+18.5
O	KEYDATA CORP	2- 3	2	0	0.0
A	LOGICON	7- 16	16 1/4	+2 1/4	+16.0
A	MANAGEMENT DATA	1- 2	1 1/4	0	0.0
A	NATIONAL CSS INC	19- 25	19 3/4	+ 3/4	+3.9
G	NATIONAL DATA CORP	4- 7	4 7/8	+ 1/4	+5.4
A	ON LINE SYSTEMS INC	17- 22	16 3/4	- 1/4	-1.4
N	PLANNING RESEARCH	3- 5	3 7/8	+ 3/8	+10.7
O	PROGRAMMING & SYS	0- 0	1/2	- 1/8	-20.0
O	RAPIDATA INC	2- 3	2 1/4	+ 3/8	+20.0
O	REYNOLDS & REYNOLDS	17- 20	18	+ 1/2	+2.8
O	SCIENTIFIC COMPUTERS	1- 3	3 1/8	- 1/4	-7.4
O	TYMSHARE INC	14- 20	17 1/2	+ 1/2	+2.9
A	UPS SYSTEMS	4- 5	4 5/8	- 1/8	-2.6
N	WYLY CORP	1- 2	1 3/8	- 1/4	-15.3

PERIPHERALS & SUBSYSTEMS

EXCH		1977 RANGE (1)	CLOSE JUN 15 1977	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	10- 14	12 5/8	+ 3/8	+3.0
O	ADVANCED MEMORY SYS	7- 9	7 1/2	- 1/8	-1.6
N	AMPEX CORP	8- 9	9 1/8	+ 7/8	+10.6
O	ANDERSON JACOBSON	3- 4	3 1/4	+ 1/4	+8.3
N	APPLIED DIG DATA SYS	10- 16	14 3/4	+1 1/2	+11.3
O	BEEHIVE INT'L	8- 12	8 1/2	0	0.0
A	BOLT, BERANEK & NEW	7- 8	6 5/8	- 1/8	-1.8
N	BUNKER-RAMO	8- 12	9 7/8	+ 3/8	+3.9
A	CALCOMP	3- 5	2 3/4	+ 1/8	+4.7
O	CAMBRIDGE MEMORIES	1- 3	2 1/P	- 1/8	-8.1
N	CENTRONICS DATA CORP	22- 29	28	- 1/4	-0.8
O	COGNITRONICS	1- 1	5/8	- 1/8	-16.6
O	COMPUTER COMMUN.	5- 6	5 7/8	+ 1/8	+2.1
O	COMPUTER CONSOLES	4- 7	6 1/4	+ 1/2	+8.6
A	COMPUTER EQUIPMENT	2- 3	3 1/8	+ 1/8	+4.1
O	COMPUTER TRANSCEIVER	1- 1	1 1/8	0	0.0
O	COMTEN	9- 13	9 1/2	- 1/4	-2.5
N	CONRAC CORP	19- 24	24 1/4	+1 1/4	+5.4
O	DATA ACCESS SYSTEMS	4- 5	4 1/4	0	0.0
O	DATA 100	6- 8	6 1/4	0	0.0
A	DATA PRODUCTS CORP	9- 13	11 7/8	+ 1/8	+1.0
O	DATA TECHNOLOGY	3- 4	3 3/4	0	0.0
O	DATUM INC	1- 2	1 1/2	- 1/8	-7.6
O	DECISION DATA COMPUT	2- 2	1 3/4	+ 1/4	+16.6
O	DELTA DATA SYSTEMS	1- 1	3/8	0	0.0
N	ELECTRONIC M & M	4- 5	3 7/8	- 1/8	-3.1
O	FABRI-TEK	1- 2	1 1/8	+ 1/8	+11.7
O	GENERAL COMPUTER SYS	0- 2	1 1/2	+ 1/8	+9.0
N	HAZELTINE CORP	9- 12	9 5/8	0	0.0
N	HARRIS CORP	28- 39	37 1/4	- 1/2	-1.3
A	INLOTERN CORP	11- 15	12 3/4	+1 1/4	+10.8
O	INFOREX INC	4- 7	4 1/2	+ 1/2	+12.5
O	INFORMATION INTL INC	11- 14	10 1/2	0	0.0
G	INTEL CORP	38- 57	46	0	0.0
A	LUNDY ELECTRONICS	3- 6	4 1/8	- 1/8	-2.9
O	NSI DATA CORP	6- 8	7 1/2	0	0.0
A	MOHAWK DATA SCI	5- 8	5 3/8	0	0.0
O	PENRIL CORP	2- 5	4 1/4	0	0.0
A	PERTEC CORP	7- 9	6 5/8	0	0.0
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	PRECISION INST.	2- 2	1 1/2	0	0.0
O	QUANTOR CORP	4- 5	3 5/8	+ 1/8	+3.5
O	RECOGNITION EQUIP	6- 10	7 3/8	+ 1/4	+3.5
O	SCAN DATA	1- 2	1 5/8	+ 1/8	+8.3
O	STORAGE TECHNOLOGY	10- 13	12 3/4	- 1/2	-3.7
O	T BAR INC	7- 10	10 1/4	+1	+10.8
O	TALLY CORP.	4- 6	4 1/8	- 1/8	-2.9
O	TEC INC	7- 10	8 1/4	+ 3/8	+4.7
N	TEKTRONIX INC	29- 36	35 1/4	+1	+2.9
N	TELEX	2- 3	2 1/2	0	0.0
O	WILTEK INC	1- 1	3/8	- 1/8	-25.0

SUPPLIES & ACCESSORIES

EXCH		1977 RANGE (1)	CLOSE JUN 15 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	BALTIMORE BUS FORMS	2- 4	1 3/4	- 1/8	-6.6
A	BARRY WRIGHT	10- 14	12 1/2	+ 1/4	+2.0
O	CYBERNATICS INC	1- 1	5/8	+ 1/8	+25.0
O	DURLEX PRODUCTS INC	14- 18	16 1/2	+ 1/2	+3.1
N	ENNIS BUS. FORMS	6- 7	6 1/8	+ 1/2	+8.8
O	GRAHAM MAGNETICS	11- 14	14	+1	+7.6
O	GRAPHIC CONTROLS	15- 18	16 3/4	0	0.0
N	3M COMPANY	48- 56	48 3/8	- 1/8	-0.2
C	MOORE CORP LTD	29- 37	28 1/2	0	0.0
N	NASHUA CORP	16- 22	20 3/4	+ 1/2	+2.4
O	STANDARD REGISTER	18- 24	23	+ 1/4	+1.0
O	TAB PRODUCTS CO	13- 17	16 3/4	+1	+6.3
N	UARCO	19- 22	20	+ 1/8	+0.6
A	WABASH MAGNETICS	10- 15	14 5/8	0	0.0
N	WALLACE BUS FORMS	17- 21	17 1/4	- 3/8	-2.1

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